American Journal of Public Health

And *The Nation's Health*

Volume 25 — March, 1935 — Number 3

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Published by the

American Public Health Association

374 Broadway, Albany, N. Y.

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American Journal of Public Health
and THE NATION'S HEALTH

Volume 25 March, 1935 Number 3

Relation of the Retail Price of Milk to Production Costs*

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THE watersheds of our rivers have played an important part in the development of this country; but it is the milkshed of the vast stream discharging some 3 million quarts a day into the milk bottles of Greater New York which has caused a new landmark to be set up in the political economy of the state, and which has become one of the proving grounds for the joint problems of agricultural relief and industrial control. Milk has become a public utility in the sense that 7 states—and where the states have not acted, the federal government—have assumed responsibility of guaranteeing to the producers of milk a fair return, and of protecting the consumer against unfair cost. Health officials are not primarily interested in the price of milk; yet when cutthroat competition demoralizes the industry, or when low prices to producers threaten bankruptcy, or when exorbitant prices curtail the buying power of the masses, or when a milk strike shuts off a city's supply, the health officer has a very immediate concern. In other words, in so far as the economic aspects of the milk industry have an impact upon a continuous supply of standard quality, the public health considerations loom large.

For these reasons the Legislature of New York State made the Health Commissioner an *ex-officio* member of a milk control board established in 1933. This board was given absolute authority to regulate and control every phase of the dairy industry in New York except sanitary control. The constitutionality of the law was upheld by the United States Supreme Court.

On the whole, our experience with state regulation has shown that it is of value to the producer. Dealers have operated with a narrower spread between the buying and the selling price. The farmer receives a larger percentage of the consumer's milk dollar than under previous unregulated competitive conditions. During the past 12 months New York State farmers received 23 million dollars more for their milk than in 1931 although the selling price in New York City averaged slightly over 2 cents per quart less than in 1931.

* Read before the Public Health Engineering Section of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 3, 1934.

TABLE I

ESTIMATED COST OF PRODUCING MILK IN 1932
(Based on Warren-Misner Formula)

Item	
Grain, 30 lb. @ $23.99 per ton [1]	$0.36
Silage, 100 lb. @ $6.00 per ton [2]	.30
Hay, 60 lb. @ $7.08 per ton [3]	.21
Labor, 2.5 hours @ $.20 per hour	.50
Total feed and labor (80%)	$1.37
Other costs (20%) [4]	.34
Total yearly cost (100%)	$1.71
Average net price to farmers [5]	1.26
Loss	$0.45
Net return per hour of labor [6]	$0.02

1. Grain is charged at $4.00 per ton above the wholesale price for a dairy ration at Utica, N. Y., as reported in *Farm Economics*, New York State College of Agriculture.

2. Silage is charged at the approximate cost of growing and harvesting as shown by cost accounts on New York farms.

3. Hay is charged at the prevailing price on the farm, as reported in *Farm Economics*.

4. Miscellaneous costs, other than feed and labor, have been found to constitute about 20 per cent of the total cost of producing milk. In these computations, these miscellaneous costs are estimated at 25 per cent of the feed and labor costs, with labor charged at $.20 per hour.

5. Average of the Dairymen's League net pool price and the Sheffield price, 201–210 mile freight zone, for milk testing 3.6 per cent fat.

6. The average net price for milk less all charges except for labor, divided by 2.5, the approximate hours of labor per 100 lb. of milk.

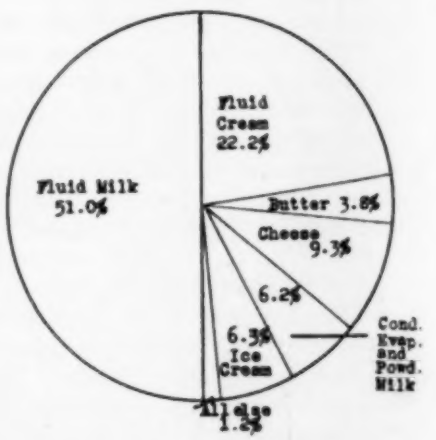
Public dissatisfaction with the price of milk in relation to what the farmer gets is a perennial topic in most cities. Few consumers understand, for example, why the farmer in New York State in July, 1934, received an average price of $1.61 per cwt. (3.5 cents per quart) while the consumer in New York City pays 13 cents for Grade B milk and 16 cents for Grade A milk delivered at the doorstep. I shall not undertake to prove that this "spread" is justified. I shall attempt, however, to give you a statistical picture of the elements in this spread.

Let us first consider production costs. Professor Warren of Cornell University, from investigations covering 9 dairy states, has devised a formula for determining these costs. Tests in other milksheds show the formula to be accurate within 4 per cent. It is based on the fact that it requires 190 lb. of various types of feed and 2½ hours' labor to produce 100 lb. of milk. These two elements constitute 80 per cent of milk production costs. In Table I this formula is applied to feed costs in New York for the year 1932 at a 20 cents per hour labor rate. For the first 6 months of 1934 the monthly average of milk prices per cwt. was $1.61 as compared to a production cost of $2.16.

One apparent reason for the difference between the price received by the farmer and the retail price is that in New York State only about one-half of all milk produced is sold as fluid milk. Figure I shows the utilization of milk for 1931. The milk which cannot be sold as fluid milk brings a somewhat lower price as fluid cream and succes-

FIGURE I

UTILIZATION OF MILK RECEIVED AT DAIRY PLANTS IN NEW YORK STATE, 1931



Only about half the total supply for the year is used as fluid milk and less than three-fourths as fluid milk and cream. The remainder is converted into manufactured products. There are wide seasonal differences in utilization.

sively lower prices for ice cream, evaporated milk, cheese and butter. In other words, the surplus which must be sold at cheaper rates lowers the average price.

One is inclined to say, "Eliminate the surplus by reduced production or increased consumption." Unfortunately, because of the nature of the milk business a surplus of at least 25 per cent over average fluid requirements is necessary to meet unpredictable variations between supply and demand. While the farmer in New York was receiving $1.61 per cwt. during the first half of 1934 the price he received for milk consumed as fluid milk was $2.40, while that paid for milk which went into butter and cheese averaged less than $1.00.

These prices which I quote are at the country milk plant, 200 miles from New York City. More or less actually is paid depending upon whether the milk is closer to or further from New York City.

The elements which enter into the dealer's spread are summarized for 19 New York City dealers for August, 1933, for fluid milk and fluid cream (see Table II). At that time the retail price of home-delivered milk was 12 cents and 15 cents, yet attention is called to the fact that the average sale by the dealer, wholesale and retail, amounted to only $.086. Prices of milk at stores were 1 and 2 cents less than the home-delivered price. The actual utilization of milk by classes is shown in a later table.

Attention is called also to the great variation in the efficiency of operation of these 19 dealers. Only 5 of them made a profit for that month. One or two of the largest made relatively large profits, while a considerable percentage were losing money. This factor introduces a most baffling problem in attempting to fix milk prices to producers and to consumers. Obviously the state cannot guarantee a profit to the least efficient element in the industry. Should prices be set which will drive out of business one-quarter, one-half, or nearly all of the milk dealers? To do this would tend to create a monopoly, and with the present uncertainty as to the nature and extent of permanent state

TABLE II

SUMMARY OF SALES, COSTS AND PROFITS, 19 NEW YORK CITY DEALERS, AUGUST, 1933

Item	*Amount per Quart*			*Per Cent of Sales*
	Average	*High*	*Low*	
Sales	$.08651	$.10254	$.05222	100.00
Product Cost	.04440	.06230	.03126	51.33
Gross Spread	.04211	.04894	.00894	48.67
Operating Costs				
Country Plants	.00469	.00931	.00000	5.42
Transportation	.00620	.00798	.00000	6.96
City Pasteurizing Plants	.00428	.00600	.00000	4.95
Containers	.00178	.00318	.00054	2.06
Delivery and Selling	.02344	.03464	.00259	27.09
General and Administrative	.00186	.00403	.00081	2.15
Total Operating Costs	$.04207	$.05827	$.01448	48.63
Net Operating Profit	.00004	.00371	−.01218	0.04
Net Other Expense	−.00004	.00048	−.00427	−0.05
Net Profit before Taxes	.00008	.00330	−.01266	0.09
Federal Income Tax	.00001	.00040	.....	0.01
Net Profit after Taxes	.00007	.00290	−.01266	0.08

TABLE III

DISTRIBUTORS' MARGINS ON RETAIL MILK, STANDARD GRADE *

Year	Hartford	Boston	New York	Philadelphia	Baltimore	Washington	Milwaukee	Pittsburgh	Minneapolis
				(Cents per quart)					
1921.....	6.4	6.9	...	5.2	5.8	...	...	7.2	5.3
1922.....	6.4	6.2	6.8	5.2	5.5	...	...	5.8	4.9
1923.....	6.5	6.0	6.7	5.3	5.3	...	...	6.0	5.1
1924.....	6.5	6.0	6.6	5.0	5.3	6.5	4.8	6.1	5.5
1925.....	6.5	6.0	6.7	5.0	5.1	6.4	4.6	6.0	5.4
1926.....	6.6	6.0	6.8	5.1	5.4	6.5	4.7	6.1	5.4
1927.....	6.5	6.2	6.9	5.3	5.7	6.7	4.6	6.3	5.2
1928.....	6.5	6.5	6.9	5.3	5.7	6.6	4.5	6.2	5.8
1929.....	6.6	6.5	7.0	5.4	5.7	6.2	4.7	6.3	5.9
1930.....	6.5	6.6	6.9	5.3	5.8	6.2	4.9	6.2	5.7
1931.....	6.5	6.6	6.9	5.1	5.4	6.1	4.5	5.9	5.7
Av. 1921–31...	6.5	6.3	...	5.2	5.5	...	...	6.2	5.4
Av. 1926–30...	6.5	6.4	6.9	5.3	5.7	6.4	4.7	6.2	5.6

* These margins were computed as follows: The quoted Class I or Basic Prices were adjusted to a uniform basis. The quoted prices for each market were adjusted so as to apply to milk of the average fat content sold in each city. The margins given are the result of subtracting the adjusted Class I or Basic Prices from the quoted retail prices for each market as reported by the U. S. Department of Agriculture. From these margins must come the cost of city processing and distribution, and the distributors' profits.

and federal control this seems contrary to the public interest. In other words, unless rigorous control is to be exercised permanently, or unless cities themselves are to operate milk distribution systems or give limited franchises to one or two companies, it does not seem reasonable to destroy a large number of distributors even though admittedly there are too many for efficient operation. There is an even more practical consideration. When faced with losses milk dealers, in spite of rigorous laws, will seek to evade the required payments to farmers; or, if a dealer does go into bankruptcy, a large group of farmers stand to lose several months' milk payments and often are left with no market outlet.

The problem of the dealer's spread becomes somewhat simplified when we consider the actual operating costs for a typical month, as shown in Table II. How justifiable each of these costs may be furnishes ground for debate. Let us consider two items. There are too many distributors for efficient operation; there are also too many country plants. Country plant costs approximate ½ cent per quart. One-half the number would operate as efficiently, but in a highly competitive business how can the state compel combinations of plants short of actual ownership?

Delivery and selling costs amount to nearly 2½ cents per quart. If home deliveries alone were considered this cost would be nearly doubled. It is obvious that unified selling and delivery in place of the present multiplicity of plants, trucks and wagons would reduce these costs materially if equal efficiency of operation could be assumed. It would be of interest if some city in the country were to experiment with municipal operation of the milk distribution system. Bearing in mind natural variations in costs between different cities because of obvious factors, some yardstick as to relative performance would be had. In connection with variations in costs between different cities, data collected by a legislative commission in New York will be of interest and are shown in Table III. These margins were adjusted to make

the comparison as accurate as possible.* Natural variations in spread depend upon many local factors which cannot be discussed in the limits of this paper.

TABLE IV

ANALYSIS OF GROSS SPREAD
19 NEW YORK CITY DEALERS, AUGUST, 1933

Item Sold	*Per Cent of Total Milk Equivalent*	*Average Selling Price*	*Average Cost*	*Average Gross Spread.*	*Per Cent of Total Spread*
Grade B Milk		Per Quart of Milk Equivalent			
Retail, Bottled	19.9	$.1210	$.0521	$.0689	32.6
Wholesale, Bottled	19.1	.0981	.0527	.0454	20.7
Wholesale, Bulk	4.9	.0823	.0485	.0338	3.9
Other Dealers	5.7	.0681	.0527	.0154	2.1
Total	49.6	.1023	.0520	.0502	59.3
Grade A Milk *					
Retail, Bottled	10.0	.1542	.0677	.0865	20.6
Wholesale, Bottled and Bulk	1.7	.1327	.0673	.0654	2.6
Other Dealers	0.4	.0850	.0677	.0173	0.2
Total	12.1	.1489	.0676	.0812	23.4
Cream					
Retail, Bottled	4.8	.0707	.0318	.0389	4.5
Wholesale, Bottled	9.4	.0522	.0324	.0198	4.4
Wholesale, Bulk	5.3	.0436	.0337	.0099	1.2
Other Dealers	2.2	.0410	.0340	.0070	0.4
Total	21.7	.0531	.0328	.0203	10.5
Other Products	16.6	.0374	.0200	.0174	6.8
All Products	100.0	$.0865	$.0444	$.0421	100.0

* Includes small amount of certified and other special milk.

In Table IV the gross spread of 19 New York State dealers for August, 1933, is analyzed. From this it is seen that, from the total volume of milk equivalent, 50 per cent was sold as Grade B fluid milk, 12 per cent as Grade A, 22 per cent as cream, and 16 per cent in various by-products.

In recent years a new factor has entered into the costs of most kinds of business. This is the lack of capacity operation. Milk consumption in New York City has dropped about 15 per cent although at present the decline has halted and seems to be started on an upward trend again. This reduced consumption, coupled with a slightly increased production of milk, is the primary factor which brought about the collapse in milk prices and the resultant state control.

Because present consumption of milk throughout the state is considerably less than is needed for normal human nutrition, to meet this problem New York has pioneered in state action to increase consumption through advertising. The cost is borne jointly by producer and dealer. If this venture is attended with the same success as experienced in advertising other food commodities, both public and industrial health will be promoted thereby.

* For full discussion see Report of the Joint Legislative Committee to Investigate Milk Industry, page 187.

The milk industry, like others, has been criticised for over-capitalization, for seeking to pay dividends on "watered stock," and similar practices common to American business generally.

The data I have given above do not relate to return on capital but solely to operating costs. In 1931, 28 of the larger distributors in New York City valued good will at 7.4 per cent of total assets. The valuations of lands, buildings, and equipment probably represented the previous higher level of prices. Studies made by the New York Milk Control Board in August, 1933, sought to eliminate from reported costs and capital investment every unnecessary or "padded" item. These adjustments in cost and net worth included holding company charges, excessive salaries of officers, idle property, good will, and increase in value of fixed assets. This reduction both in reported costs and investment increases the apparent rate of return on the dealer's net worth from 1/8 per cent to 3⅓ per cent per year. However, this maximum apparent saving in costs would amount only to 1/10 cent per quart of milk. In other words, excessive salaries and over-capitalization in themselves do not contribute materially to the price of a quart of milk. If substantial reductions in the costs of milk to the public are to be made, they must be accomplished through more efficient operations or the elimination of costly services.

This is a brief sketch of milk costs and control measures up to date. What of the future? What are the objectives? In my opinion state control must provide the consuming public with an adequate and continuous supply of safe and wholesome milk at a price which represents a just return and no more to producers and distributors for their labor and investment. Costs cannot be guaranteed either to the inefficient producer or distributor. Milk has become a public utility in effect if not in name in New York and in many other milksheds of the country. In other public utilities we have seen some measure of public ownership and operation following earlier attempts at regulation. Shall we see a similar venture in the milk industry? Some thoughtful students of the problem see no way of reducing materially the present spread between the retail price of milk and the price received by the farmer unless major reforms are made in the industry, or unless the state or municipalities undertake public operation. The necessary major reforms to increase efficiency are scarcely possible unless in each milkshed a practical monopoly is exercised either by farmers' coöperatives, by the distributing companies, or by both.

If there should be a real shortage of milk as prophesied in bulletins following the recent drought, competitive conditions of previous years again may prevail. So long as production continues greatly in excess of fluid consumption, public regulation of prices to farmers probably will be continued. If production costs increase and consumer resistance to higher prices tends to reduce consumption, there may be public demand for major reforms in milk distribution or municipal operation.

The Cause of Breast Cancer*

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THE prominent location, characteristic clinical course and high fatality rate of cancer of the breast make its official mortality returns a particularly reliable index to its actual occurrence.[1] Examination of the data for different times and places reveals variations in its incidence deserving analysis and interpretation that may well be withheld from forms of cancer offering greater difficulty in recognition.[2]

The number of deaths from cancer of the breast in any particular time and place tells us little regarding its relative importance unless this is expressed in terms of the number of persons exposed to such a possibility. The rate for the entire population is usually the most readily ascertainable figure. This may be, however, quite misleading, if variations in the composition of the population affecting this rate are not recognized.[3]

Since nearly 99 per cent of all cancers of the breast occur in women,[4] the rate for the entire population may be expected to be low in regions where males predominate, as in Nevada with 14 males to each 10 females, and high in places where there is an excess of females, as the District of Columbia with only 9 males to each 10 females.[5] This source of error is eliminated in tables in which the deaths are expressed in terms of the number of females living, but for most large populations it is of little importance.

The age distribution of the population constitutes a much greater source of variations and misconceptions. Cancer of the breast, as most other forms of cancer, is almost unknown in childhood and youth, and extremely rare in young adults, but its incidence increases rapidly during middle life and continues to rise up to extreme old age. The greatly higher death rate from breast cancer in older people is shown in practically all statistics that have been examined (Table I).

TABLE I

AGE AND BREAST CANCER, U. S. REGISTRATION STATES, 1930

Age (Years)	*Population*	*Deaths, Breast Cancer*	*Rate per 100,000 Population*	*Per Cent of All Cancers*
0– 4..	10,833,222	2	0.02	0.02
5–14..	23,347,523	3	0.01	0.03
15–24..	21,235,387	21	0.10	0.20
25–34..	18,017,199	290	1.61	2.68
35–44..	16,451,562	1,441	8.76	13.32
45–54..	12,487,707	2,671	21.42	24.68
55–64..	8,086,614	2,935	36.30	27.10
65–74..	4,559,756	2,107	46.20	19.44
75–....	1,841,550	1,354	73.60	12.53
Total ..	116,950,331	10,831	9.27	100.00

The actual number of deaths from breast cancer at the different ages, accordingly, varies with the age composition of the population concerned. Not only will there be a lower incidence of breast cancer in places with relatively few old people than in places where there are more aged inhabitants, but the age at which the majority of

* Read before the Vital Statistics Section of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 3, 1934.

the cancers actually appear will be correspondingly lower. Thus, in New Mexico, where less than 18 per cent of the population is over 45 years of age, only 61 per cent of the deaths from breast cancer occur after this age; while in New Hampshire, where more than 30 per cent of the population is over 45 years of age, more than 87 per cent of the breast cancer deaths occur in this age group.

A similar change in the age distribution of the persons dying with breast cancer as a result of the aging of the entire population may be seen in the returns for the U. S. Registration States of 1910 during the past two decades (Table II).

TABLE II

BREAST CANCER DEATHS IN THE U. S. REGISTRATION STATES OF 1910

	1911	*1920*	*1930*
Population	*48,295,860*	*56,080,552*	*66,442,606*
Breast Cancer....	3,610	4,900	7,409
Rate All Ages *..	7.5	8.8	11.2
Rate Age 15–44..	2.9	3.1	3.6
Rate Age 45–64..	22.1	25.6	34.0
Rate Age 65–....	49.8	55.0	61.6
% Population over 45	20.9	24.0	25.6
% Breast Cancer over 45.....	80.6	82.7	84.4

* All rates, per 100,000 aggregate population.

Most, but not all of the increase in the proportion of breast cancer deaths occurring above 45 years of age in recent years may be ascribed to this change in the age distribution of the entire population. A small but significant lowering of the mortality rates from this cause at the younger ages, however, and a definite increase in the older age groups, may be seen (Table III). The prolongation of life through palliative surgical and radiation therapy, even in incurable cancer of the breast, may be, at least in part, responsible for this change.[6] This is supported by the fact that the average age of breast cancer cases reported in hospital statistics and in surgical reports is distinctly lower than that found in mortality reports.[7]

TABLE III

BREAST CANCER DEATH RATES PER 100,000 WHITE FEMALES, 1911–1930

METROPOLITAN LIFE INSURANCE COMPANY INDUSTRIAL DEPARTMENT *

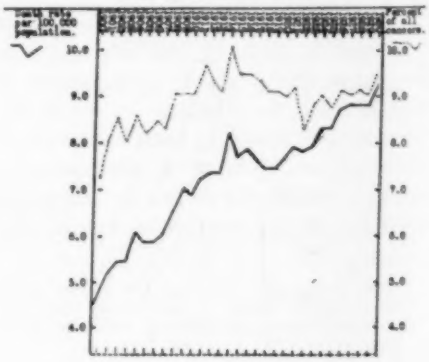
Age Period (Standardized)	*Average Annual Death Rate*	*Mean Annual Change*	*Standard Error*
25–44.....	8.8	—0.09	±0.031
45–74.....	50.9	+0.42	±0.109
1–74.....	12.3	+0.05	±0.021

* Courtesy of Dr. Louis I. Dublin.

The crude mortality rate from breast cancer in the U. S. Registration Areas, as in most other countries, has been steadily rising during the past 30 years. By far the greater part of this change is obviously due to the change in the age distribution of the population. Even in the standardized or the age specific rates, however, an upward trend may be observed (Table II).

With the improvement in diagnostic methods, and the wider use of medical services, more cancers of inaccessible sites are being recognized, with consequent increase in the total number of cancer deaths reported.[8] Accessible tumors such as those of the breast may be expected to share but little in this increased recognition. Accordingly, the fact that there has been no decrease in the proportion of breast cancers to the

FIGURE I—BREAST CANCER IN THE UNITED STATES, 1900–1930



total number of cancers also indicates that there has been an increase in the real prevalence of this condition (Table IV and Figure I).

TABLE IV

BREAST CANCER IN THE UNITED STATES, 1900 TO 1930

Year	Death Rate per 100,000 Population	Percentage of All Cancers
1900	4.5	7.3
1901	5.2	8.0
1902	5.4	8.5
1903	5.4	8.0
1904	6.1	8.6
1905	5.8	8.2
1906	5.8	8.4
1907	6.0	8.3
1908	6.5	9.1
1909	7.0	9.1
1910	6.9	9.1
1911	7.2	9.7
1912	7.3	9.4
1913	7.3	9.2
1914	8.2	10.1
1915	7.7	9.5
1916	7.8	9.5
1917	7.6	9.4
1918	7.4	9.2
1919	7.4	9.2
1920	7.6	9.1
1921	7.9	9.3
1922	7.8	8.3
1923	7.9	8.9
1924	8.3	9.1
1925	8.3	8.8
1926	8.7	9.2
1927	8.8	9.1
1928	8.8	9.2
1929	8.8	9.1
1930	9.2	9.5

Since these mortality figures do not include the increasing numbers of persons who have been successfully operated upon for cancer of the breast in recent years,[9] there seems little doubt that the actual incidence of breast cancer is increasing, at least in this country and Great Britain.

The frequency of breast cancer in different countries varies widely.[10] The data need to be adjusted for the large variations in the age distribution in different countries, but this does not suffice to remove the marked discrepancies noted. Deficiencies in the completeness of death registration and in the accuracy of diagnosis in different countries, it would seem, should lead to an apparent lowering of the absolute incidence of breast cancer, but to an apparent increase in the proportion which it constitutes of all cancers. The close parallelism between these two types of data, however, indicates that the differences observed between countries is not generally due to variations in the age and sex distribution, or in the adequacy of death registration (Table V).

The rarity of all cancers in primitive peoples has been seriously questioned,[11] but as to its relatively infrequent localization in the female breast there appears little doubt. Available information from Japan and India, and from Chile and Uruguay, reveals breast cancer in these countries extremely seldom as compared to the European countries, while the English speaking countries report much higher figures.[12]

Different states in the United States show similar differences, which may not be entirely explained away by variations in the age and sex distribution of the population, or by differences in the adequacy of registration and diagnosis, although these may play a part. Thus, in 1920 the breast cancers in Massachusetts, with an adjusted mortality rate of 11.2 per 100,000 population, constituted 11.3 per cent of all cancers in that state, while in Mississippi, with an adjusted mor-

TABLE V

BREAST CANCER IN DIFFERENT COUNTRIES, 1930

Country	Rate per 100,000 Females	Per Cent of All Cancers	Birth Rate per 1,000 Population	
			1930	1910
England and Wales	29.2	19.1	16.3	23.8
Scotland	23.4	15.0	19.5	26.1
Denmark, urban	22.6	17.3	18.7	25.6
New Zealand	22.4	20.0	18.8	26.0
Switzerland	21.2	11.0	17.2	23.9
Netherlands	19.3	13.8	23.1	28.2
United States	17.6	16.1	18.9	24.9
Australia	16.5	17.2	19.9	28.1
Ireland	16.0	16.0	20.2	22.6
Norway	14.5	7.4	24.5	25.3
Canada	11.5	17.6	24.5	26.6
Italy	6.0	10.0	26.2	31.7
Spain	3.6	7.0	29.0	31.2
Ceylon	3.6	7.6	39.0	38.1
Japan	1.8	3.0	32.4	34.1
Chile	1.2	2.0	39.8	37.0

tality rate of 3.4 per 100,000 they constituted only 6.8 per cent of all cancers.[13]

In general, breast cancer mortality rates have been higher in urban than in rural districts, in northern than in southern states, and in whites than in negroes. Although a large part of the apparent differences in the crude rates disappears when they are adjusted for age distribution, the general relations remain, and the proportion of breast cancers to all cancers shows the same relations (Table VI).

TABLE VI

BREAST CANCER AND THE BIRTH RATE IN THE UNITED STATES

State	Breast Cancer per 100,000 Females, Age 45+ 1930	Deaths per 100 of All Cancer 1930	Births per 1,000 Females, Age 15–44 1930	1900
Massachusetts	109.4	11.2	70	90
Rhode Island	108.9	10.5	73	93
New York	107.3	10.5	66	93
Connecticut	103.5	10.7	71	96
California	99.4	10.5	62	82
Maryland	95.8	10.1	78	111
Idaho	92.5	11.0	95	155
New Jersey	91.4	10.0	68	102
Washington	90.4	9.5	63	106
Minnesota	89.9	8.4	79	139
Oregon	89.8	9.6	62	94
Missouri	89.5	9.1	71	110
Michigan	89.0	10.0	87	104
New Hampshire	88.6	9.3	81	90
District of Col.	88.4	9.1	63	70
Ohio	88.2	10.1	75	96
Montana	87.8	9.8	85	123
Illinois	87.7	10.1	67	105
Iowa	86.2	9.6	76	113
Kansas	83.9	7.8	78	115
Colorado	83.1	9.2	77	101
Utah	82.4	9.4	113	160
Wyoming	82.3	9.3	89	133
Nebraska	82.1	8.6	84	124
Wisconsin	82.0	8.2	84	123
Delaware	80.0	9.6	81	104
Pennsylvania	79.2	8.9	83	112
Vermont	72.5	8.2	94	96
Maine	71.0	7.1	95	92
Indiana	70.6	8.5	80	105
Louisiana	70.2	9.0	81	134
Florida	69.1	10.0	73	138
Alabama	68.6	10.7	101	142
South Dakota	67.2	8.3	80	150
Kentucky	66.3	9.3	101	133
Virginia	57.6	8.7	98	132
New Mexico	56.2	9.0	126	163
Georgia	54.3	8.8	84	147
Tennessee	53.1	8.7	83	134
Mississippi	52.7	8.3	99	139
West Virginia	52.0	7.5	107	150
Arkansas	50.0	9.6	93	149
North Carolina	49.6	8.3	102	150
Arizona	42.4	5.6	102	133
Oklahoma	40.5	6.6	110	160
Nevada	37.5	4.1	75	100
South Carolina	36.5	7.0	94	152
North Dakota	35.7	4.4	98	168

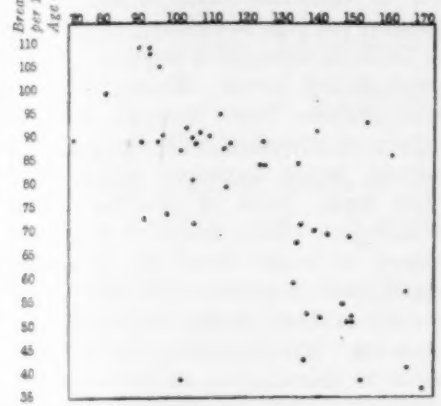
It has been repeatedly noted in recent years that cancer of the breast is relatively much more frequent in single than in married women.[14] It appears also to be true that among the married women cancer of the breast is more often encountered among the nullipara than among those who have borne children, and there are indications that it is even less frequent among those who have had a large number of children.[15]

These last observations may be readily harmonized with the foregoing mortality statistics, and go far to clarify the differences that are observed. If childbearing and lactation tends to prevent cancer of the breast, it may be readily expected that the incidence of cancer of the breast in recent years would rise in most places with a falling birth rate, and that the countries with higher birth rates, like Japan, or the southern and rural districts in the United States, or the negroes and other population groups having a higher birth rate, would still have a low incidence of cancer of the breast.

If the states are arranged in the order of their breast cancer mortality rates for the female population over the age of 45 only, thus avoiding discrepancies due to age and sex differences, there is found a very high inverse correlation with that obtained by taking them in the order of their birth rate for the female population between the ages 15 and 45. In other words, generally speaking, states with a high breast cancer rate have a low birth rate, and *vice versa*.

Logically, of course, we may expect that the birth rate of 30 years or so prior, when the women now developing

FIGURE II—BREAST CANCER AND THE BIRTH RATE IN THE UNITED STATES



cancer of the breast were in their childbearing age, would better reflect the influences bearing on them than that today. Unfortunately, the U. S. Registration Area for Births is only 18 years old, and has only recently included all of the states. The census for 1900,[16] however, included an attempt at an approximation of the birth rate in the various states at that time, and this may be taken, for want of better, for comparison. It may be seen that although the actual birth rate has decreased markedly in practically all parts of the country, the relative order of the different states shows little change not accounted for by differences in the age and sex composition of the people. Accordingly we find again that the states with the high breast cancer rate in 1930 generally showed a low birth rate in 1900, and the states with the high birth rate in 1900 are found to have a low breast cancer rate in 1930 (Table VI and Figure II).

Available data for the different countries of the world agree with this finding (Table V). Arranging the various countries in the order of increasing birth rate in 1900, or before the war, gives almost the same list as that in the order of increasing mortality rate from cancer of the breast, or the ratio of breast cancer to total cancers. A superficial inquiry into the different countries involved also emphasizes the fact that cancer of the breast is more prevalent where early weaning of the infant is the rule, and is less often met with where breast feeding is common and prolonged.

Clinical investigation of large groups of women suffering from cancer of the breast confirms and amplifies these observations.[17] Not only is cancer of the breast found with disproportionate frequency in single women and in nullipara, but it is also more prevalent among women who have had miscarriages or stillbirths or for some other reason, although pregnant, have failed to nurse their young. Particularly suggestive are the reports of cases where cancer has developed in an unused breast, and not in the contralateral lactating breast.

These are objective facts gleaned from an impersonal survey of official records and clinical data by a number of different workers, and confirmed by a series of case records personally examined for the present study. They indicate quite definitely that the retention of milk and other secretions in the breast due to non-lactation may be a potent factor in the production of many, if not all, cases of carcinoma of the mammary gland, and that the removal of such substances by suckling exerts a definite prophylactic effect against the development of such tumors.

Animal experimentation sheds further light on this phenomenon. White mice that have had their young removed at birth, so that they cannot suckle them, develop mammary carcinoma quite similar to the breast cancers in women. That this is due to local retention of secretions and not to a general endo-

crine disturbance is shown by the fact that white mice that have had their breasts occluded on one side only by ligature develop cancer on that side, and not on the other. These findings, first reported by Bagg nearly a decade ago,[18] have been amply confirmed in our experience at Olive View (Table VII).

TABLE VII

EXPERIMENTAL INDUCTION OF MAMMARY CARCINOMA IN MICE

Olive View, Calif., 1932–1934

Procedure	*Total Number of Mice*	*Average Number of Litters*	*Average Survival Period, Months*	*Number Developing Breast Cancer*	*Per Cent Developing Cancer*
Young removed at birth.....	18	7	18	10	55
Nipples on left side ligated, suckling with right side	18	4	15	6	33
Normal breeding controls	18	5	18	0	0

Recent investigations into the carcinogenic actions of tars and related substances have shown that a reduced derivative of cholesterol is capable of producing cancer just as effectively as are some of the coal tar and other phenanthrene compounds.[19] Cholesterol is present in the ducts of the non-lactating female breast of the virgin, as well as in the secretions of the lactating breast,[20] and in the absence of the normal drainage that comes with lactation, it may undergo the reductions that would lead to the development of carcinogenic properties. Childbirth and lactation constitute, accordingly, a natural protection against this endogenous carcinogenic agent.

SUMMARY

Analysis of available vital statistics shows that cancer of the breast is strikingly associated with a low birth rate. Clinical investigation confirms this finding and indicates that it is more particularly related to lack of drainage of the mammary glands. Animal experimentation shows that this is due, not to endocrine derangement subsequent to the lack of suckling, but simply to the local retention of secretions in the non-lactating breast. Recent chemical investigations have revealed the existence of chemical substances in the normal breast secretions which may, after many years of retention, exert carcinogenic effects similar to those well known to result from the exogenous application of certain coal tars. The results of the clinical, biological and chemical investigations concur with those of the analysis of the vital statistics in emphasizing the etiological rôle of retained mammary secretions in the development of cancer of the breast.

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Efficacy of Typhoid Prophylaxis in the United States Navy*

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TYPHOID fever was for many years a serious problem in the United States Navy and epidemics were frequent aboard ship and on shore stations. That much time and thought was expended in efforts to solve this problem is evidenced by frequent references in the reports of medical officers of the late years of the 19th century and in the early years of the 20th century.

For this study the 44 year period 1890–1933 has been chosen. The initiation of compulsory typhoid prophylaxis in 1912 serves as the dividing line separating the 44 years into 2 periods of 22 years each. There are given the annual prevalence, deaths, case fatality, and geographical distribution during the period when vaccine was not administered and for comparison during the years when vaccine was administered, also the effects of inoculations with relation to severe reactions and deaths and, for a portion of the period, an account of the incidence of typhoid fever in individuals previously inoculated.

Reports of encouraging results following the use of antityphoid prophylaxis prompted naval authorities early in 1910 to make typhoid vaccine available to those who wished to avail themselves of it. In 1911 it was decided to require inoculation of all naval personnel, and this was done in General Order No. 133, dated December 1, 1911. This order reads:

1. As soon as practicable after the receipt of this order, typhoid prophylactic will be administered to all officers and enlisted men of the Navy and Marine Corps, under the age of 45 years, who have not already received it or who have not already had a well defined case of typhoid fever. Officers and enlisted men on leave, or on duty where no medical officer is available, will receive the typhoid prophylactic upon their arrival at the first station where this measure is practicable.

2. Typhoid prophylactic will be administered to all recruits under 45 years of age immediately upon their arrival at a training station, receiving ship, or marine recruit depot. This applies to all men reënlisting who have not received the prophylactic treatment within 2 years previously or had a well defined case of typhoid fever; in case of doubt the prophylactic will be administered. Every applicant for enlistment in the Navy or Marine Corps will be informed that he must submit to typhoid prophylaxis, and unless he agrees to acquiesce in this procedure he will not be considered for enlistment.

3. Typhoid prophylaxis must be regarded as a supplemental safeguard, and under no circumstances will the usual sanitary precautions be modified or set aside.

4. The antityphoid serum should be obtained from the Bureau of Medicine and Surgery by telegraphic or written request.

This order was promulgated to the service and immediate steps were taken to comply with its provisions. Inocula-

* Read at the Third Annual Meeting of the Southern Branch, American Public Health Association in San Antonio, Tex., November 14, 1934.

TABLE I

TYPHOID FEVER AND PARATYPHOID FEVERS, ADMISSIONS AND DEATHS, BY YEARS
UNITED STATES NAVY, 1890–1933

Year	Mean Strength	Admissions	Admission Rate per 100,000	Deaths	Death Rate per 100,000	Case Fatality Rate per 100
1890	11,768	41	348.40	1	8.50	2.44
1891	11,501	37	321.71	5	43.47	13.51
1892	11,775	59	501.06	7	59.45	11.86
1893	12,109	47	388.14	4	33.03	8.51
1894	12,520	53	423.32	4	31.95	7.55
1895	13,191	31	235.01	6	45.49	19.35
1896	14,196	56	394.48	10	70.44	17.86
1897	15,734	52	330.49	4	25.42	7.69
1898	23,986	109	454.43	12	50.03	11.01
1899	20,819	134	643.64	11	52.84	8.21
1900	23,756	175	736.66	25	105.24	14.29
1901	26,873	105	390.73	14	52.10	13.33
1902	31,240	125	400.13	14	44.81	11.20
1903	37,248	188	504.73	20	53.69	10.64
1904	40,555	194	478.36	21	51.78	10.82
1905	41,313	172	416.33	11	26.63	6.40
1906	42,529	230	540.81	14	32.92	6.09
1907	46,336	249	537.38	17	36.69	6.83
1908	52,913	176	332.62	10	18.90	5.68
1909	57,172	189	330.58	17	29.73	8.99
1910	58,691	193	328.84	10	17.04	5.18
1911	61,399	222	361.57	15	24.43	6.76
1912	61,897	57	92.09	2	3.23	3.51
1913	65,926	23	34.89	4	6.07	17.39
1914	67,141	22	32.77	0	0	0
1915	68,075	23	33.79	1	1.47	4.35
1916	69,294	21	30.31	0	0	0
1917	245,580	86	35.02	1	0.41	1.16
1918	503,792	83	16.48	9	1.79	10.84
1919	298,774	49	16.40	2	0.67	4.08
1920	140,773	35	24.86	7	4.97	20.00
1921	148,861	16	10.75	1	0.67	6.25
1922	122,126	12	9.83	2	1.64	16.67
1923	116,565	14	12.01	2	1.72	14.29
1924	119,280	7	5.87	0	0	0
1925	115,381	4	3.47	0	0	0
1926	113,756	4	3.52	0	0	0
1927	115,316	15	13.01	1	0.87	6.67
1928	116,047	20	17.23	2	1.72	10.00
1929	117,388	12	10.22	2	1.70	16.67
1930	117,453	18	15.33	1	0.85	5.56
1931	112,767	22	19.51	2	1.77	9.09
1932	110,717	20	18.06	3	2.71	15.00
1933	108,183	9	8.32	2	1.85	22.22

tions were begun early in 1912, and by the end of that year practically every person in the Navy to whom the order applied had received 3 injections of typhoid vaccine.

While there have been some minor modifications of the instructions it has not been found necessary to alter materially the original method. At present, two courses of 3 injections each are generally regarded as adequate protection. The vaccine has been obtained from the Army Medical School.

In Table I are shown the admissions

and deaths from typhoid and paratyphoid fevers among officers and enlisted men of the United States Navy for the 44 year period 1890–1933. There were 3,409 admissions and 296 deaths with a case fatality of 8.68 per cent. In the 22 year period 1890–1911, in which typhoid vaccine was not administered, there were 2,837 admissions and 252 deaths and in the 22 years 1912–1933 there were 572 admissions and 44 deaths. The case fatality rate for 1890–1911 was 8.88 per cent, and for 1912–1933 it was 7.69 per cent.

There is a striking difference in admission rates and death rates in the 2 periods. From 1890 to 1911, in only 1 year was the admission rate lower than 300 per 100,000. In 6 of the 22 years the rate exceeded 500, and in 1899 and 1900 the rates were 643 and 736 respectively. There was an abrupt drop from a rate of 361 in 1911 to 92 in 1912. Antityphoid inoculation of the entire Navy was not completed until the end of 1912 which may account for the higher rate in 1912 than for succeeding years. Except for the rate of 92 in 1912 the admission rate in the period 1912–1933 has never exceeded 35 per 100,000. In the 5 years 1913–1917, immediately following the inauguration of compulsory antityphoid prophylaxis, the rate fluctuated between 30 and 35. In the 16 year period 1918–1933 there was only 1 year when the rate exceeded 20, and in 5 of these years the rate was less than 10 per 100,000.

The decline in death rates which occurred after the introduction of compulsory antityphoid inoculation is remarkable. In the 22 years 1890–1911 there were only three occasions when the death rate was less than 20 per 100,000. In 8 of these years the rate exceeded 50, and in 15 of the 21 years it exceeded 30. In the 22 year period 1912–1933 the death rate per 100,000 was less than 3 in each year except 1912, 1913, and 1920, when it was 3, 6,

TABLE II

TYPHOID FEVER, ADMISSIONS AND DEATHS, BY YEARS
UNITED STATES NAVY, 1913–1933

Year	*Admissions*	*Admission Rate per 100,000*	*Deaths*	*Death Rate per 100,000*
1913	22	33.37	4	6.07
1914	13	19.36	0	0
1915	18	26.44	1	1.47
1916	17	24.53	0	0
1917	66	26.88	1	0.41
1918	65	12.90	9	1.79
1919	36	12.05	2	0.67
1920	28	19.89	6	4.26
1921	13	8.73	1	0.67
1922	8	6.55	2	1.64
1923	11	9.44	2	1.72
1924	5	4.19	0	0
1925	3	2.60	0	0
1926	3	2.64	0	0
1927	9	7.81	1	0.87
1928	9	7.76	1	0.86
1929	7	5.96	1	0.85
1930	11	9.37	1	0.85
1931	16	14.19	2	1.77
1932	12	10.84	3	2.71
1933	6	5.55	2	1.85
	378		39	

and 5 respectively. In the 19 years when the death rate was less than 3 there were no deaths in 5 of the years, and in 5 others the rate was less than 1. The death rate declined abruptly from 24 in 1911 to 3 in 1912.

Prior to 1913, typhoid fever and paratyphoid fevers were not separated in morbidity reports. In Tables II and III admissions and deaths for typhoid fever and for paratyphoid fevers from 1913 to 1933 are shown.

It may be seen in Table II that typhoid fever caused 378 admissions and 39 deaths in the 21 year period 1913–1933. This gives an average of about 18 cases and 2 deaths per year in a population of approximately 142,000. If the war years of 1917 and 1918 are excluded a better idea of the usual prevalence is obtained. Thus, in 19 of the years since antityphoid inoculation has been in use there has been an average of about 13 cases and 1 death in a population of approximately 118,000.

In Table III are shown admissions and deaths, by years, for paratyphoid fevers for the period 1913–1933. There were 137 admissions and 3 deaths. From 1912 to 1917 straight typhoid vaccine was used. From October, 1917, until the summer of 1924 a triple vaccine, which contained typhoid, paratyphoid A and paratyphoid B organisms, was given. Since 1924 straight typhoid vaccine has been used. There does not appear to have been a marked decrease in the prevalence of paratyphoid fevers as a result of the use of the triple vaccine. The numbers of cases are too small to warrant definite statements one way or the other.

In Table IV are shown annual death rates per 100,000 strength, United States Navy, and per 100,000 population, Registration Area of the United States, 1900–1929.

During the first 5 years of this period Navy death rates were consistently higher than those of the Registration

TABLE III

PARATYPHOID FEVER, ADMISSIONS AND DEATHS, BY YEARS
UNITED STATES NAVY, 1913–1933

Year	*Admissions*	*Admission Rate per 100,000*	*Deaths*	*Death Rate per 100,000*
1913	1	1.52	0	0
1914	9	13.40	0	0
1915	5	7.35	0	0
1916	4	5.77	0	0
1917	20	8.14	0	0
1918	18	3.57	0	0
1919	13	4.35	0	0
1920	7	4.97	1	0.71
1921	3	2.02	0	0
1922	4	3.28	0	0
1923	3	2.57	0	0
1924	2	1.68	0	0
1925	1	0.87	0	0
1926	1	0.88	0	0
1927	6	5.20	0	0
1928	11	9.48	1	0.86
1929	5	4.26	1	0.85
1930	7	5.96	0	0
1931	6	5.32	0	0
1932	8	7.23	0	0
1933	3	2.77	0	0
	137		3	

TABLE IV

TYPHOID FEVER AND PARATYPHOID FEVERS. ANNUAL DEATH RATES PER 100,000 STRENGTH, UNITED STATES NAVY, AND PER 100,000 POPULATION, REGISTRATION AREA OF THE UNITED STATES, 1901–1929 *

Year	*United States Navy*	*Registration Area of the United States*
1900	105.24	35.9
1901	52.10	32.4
1902	44.81	34.5
1903	53.69	34.4
1904	51.78	32.0
1905	26.63	27.8
1906	32.92	32.1
1907	36.69	30.3
1908	18.90	24.3
1909	29.73	21.1
1910	17.04	23.5
1911	24.43	21.0
1912	3.23	16.5
1913	6.07	17.9
1914	0	15.5
1915	1.47	12.4
1916	0	13.3
1917	0.41	13.5
1918	1.79	12.6
1919	0.67	9.2
1920	4.97	7.8
1921	0.67	9.0
1922	1.64	7.4
1923	1.72	6.8
1924	0	6.7
1925	0	8.0
1926	0	6.5
1927	0.87	5.5
1928	1.72	4.9
1929	1.70	4.2

* The death rates for the Registration Area of the United States for the period 1900–1919 are those shown in Mortality Statistics under Title No. I, *International Nomenclature* for typhoid fever and paratyphoid fevers and for 1920–1929 under Title No. Ia for typhoid fever and No. Ib for paratyphoid fevers.

Area. Beginning with 1905 and continuing through 1911, Navy rates paralleled quite closely those of the Registration Area. From 1912 on there is no similarity. The death rate in the Navy dropped from 24 in 1911 to 3 in 1912, while in the Registration Area it dropped from 21 to 16. The decline in the Navy was precipitous whereas in the Registration Area the decline, which had been in progress since 1900, continued in an orderly but gradual fashion. So far as can be determined the only change which was made in the Navy in 1912 that was not made in the Registration Area was the inauguration of antityphoid inoculation. Such improvements as were effected in sanitation including water purification doubtless affected the Navy as well as the civilian population. If it were found that the principal sources of infection for the Navy were localities where notable sanitary improvements had been made in 1912 this factor would of necessity require consideration.

The geographic distribution of typhoid fever in the Navy, 1900–1912, is here given in sufficient detail to substantiate the statement that the disease was prevalent in the Navy in a number of localities both in the United States and elsewhere.

GEOGRAPHIC DISTRIBUTION

Abstracts are given from official records in chronological order:

1900—Island of Guam, 18 cases; a ship, Atlantic Fleet, 4 cases; Gavite, P. I., 26 cases; a ship, Asiatic Fleet, 11 cases.

1901—Asiatic Station, 19 cases; a ship, Atlantic Fleet, 9 cases.

1902—Training Station, San Francisco, 7 cases.

1903—San Juan, P. R., 7 cases in Atlantic Fleet; Naval Academy, Annapolis, Md., 7 cases; Navy Yard, Norfolk, Va., 6 cases; Navy Yard, Philadelphia, Pa., 9 cases; a ship, Atlantic Fleet, 7 cases.

1904—Portsmouth, N. H., 22 cases; Receiving Ship (U. S. S. *Franklin*), Norfolk, Va., 11 cases; a ship, Atlantic Fleet, 13 cases.

1905—Training Station, Newport, R. I., 12 cases; Receiving Ship (U. S. S. *Franklin*), Norfolk, Va., 16 cases; Naval Academy, Annapolis, Md., 11 cases; Asiatic Fleet, 16 cases.

1906—A ship, Atlantic Fleet, 44 cases; Naval Academy, Annapolis, Md., 9 cases; Training Station, Newport, R. I., 16 cases; Asiatic Fleet, 8 cases; Foreign Stations, 13 cases.

1907—A ship, Atlantic Fleet, 8 cases; Foreign Stations, 11 cases; Asiatic Fleet, 9 cases.

1908—Norfolk, Va., 31 cases; Las Animas, Colo., 28 cases.

1909—Atlantic Fleet, 98 cases; Chelsea, Mass., 24 cases.

1910—Receiving Ship (U. S. S. *Franklin*), Norfolk, Va., 17 cases; a ship, Atlantic Fleet, 12 cases; Foreign Stations, 5 cases.

1911—Marines, Guantanamo Bay, Cuba, 11 cases; Foreign Stations, 16 cases.

1912—Fourteen ships and 8 shore stations reported 1 case each.

TYPHOID PROPHYLAXIS

Data are available for the 9 year period 1925–1933 with regard to the number of injections given in these years and the reactions and deaths resulting therefrom. These are shown in Table V. There were 291,796 complete courses of 3 inoculations each, January 1, 1925, to December 31, 1933.

Deaths resulted from antityphoid inoculations as follows: 1918, 2; 1923, 1; and 1926, 1.

During the 9 year period 895,680 inoculations were given. These inoculations caused 8,773 moderately severe reactions, in 2,125 instances the reaction was of sufficient severity to require admission to the sick list, and there was 1 death. There was 1 moderately severe reaction to 102 injections and 1 admission to the sick list to 421 injections. In other words, some type of reaction followed slightly more than 1 per cent of the injections.

During the 10 year period 1924–1933 there were 81 cases of typhoid fever, and of this number 73 had records of previous inoculations with typhoid vaccine. Of the remaining 8, 1 had received 1 injection; 4 had not been inoculated; and for 3 there is no record.

TABLE V

TYPHOID PROPHYLAXIS, UNITED STATES NAVY, 1925–1933

	First-Course Inoculations	*Second-Course Inoculations*	*Total*
Number administered	620,135	275,545	895,680
Moderately severe reactions	7,751	1,022	8,773
Per cent	1.25	0.37	0.98
Reactions requiring admission to sick list	1,825	300	2,125
Per cent	0.29	0.11	0.24

The time interval between inoculation and admission with typhoid fever is shown in Table VI.

It may be seen that 5 individuals developed typhoid fever within 6 months of the completion of inoculation, and slightly more than one-half the total

TABLE VI

TYPHOID FEVER IN PERSONS PREVIOUSLY INOCULATED, UNITED STATES NAVY, 1924–1933
INTERVAL BETWEEN INOCULATION AND ADMISSION

Year	*0–6 Mos.*	*6 Mos.–1 Yr.*	*1–2 Yrs.*	*2–3 Yrs.*	*3–4 Yrs.*	*4 Yrs. +*	*Total*
1924	2	..	..	1	1	..	4
1925	..	1	..	2	..	1	4
1926	..	..	..	1	..	1	2
1927	..	2	2	1	1	2	8
1928	1	1	3	2	1	..	8
1929	1	2	..	1	1	..	5
1930	1	3	1	3	2	1	11
1931	..	1	11	2	1	1	16
1932	..	1	2	3	3	1	10
1933	..	1	1	3	..	..	5
Total	5	12	20	19	10	7	73

cases occurred between 1 and 3 years after receiving 3 injections of typhoid vaccine. It is noted that there was an increase in the numbers of cases in 1930, 1931, and 1932, as compared to the years immediately preceding. The 11 cases in 1930 were reported from widely separated places under varying conditions of exposure. Of the 16 cases in 1931, 12 were reported in Marines in Nicaragua. An earthquake in March, 1931, caused extensive damage to the water works in Managua and for several months thereafter the water was grossly polluted. The water supply of the Marine Camp was chlorinated but there were numerous opportunities for exposure in the city. In 1932 there were 10 cases and of these 8 occurred in China.

SUMMARY

Typhoid prophylaxis was instituted in the Navy in 1912 and has been consistently practised since. Specific prophylaxis has consisted of the administration of typhoid vaccine to all persons in the Naval service.

Coincident with the prophylaxis a marked reduction in the incidence of typhoid fever occurred. This reduction is believed to have been due in large measure to the immunization of the personnel. The incidence of typhoid fever has gradually declined in the Registration Area of the United States. Since 1900 this decline has been more gradual than that observed in the Navy and has at no time shown the marked drop comparable to that in the Navy in 1912.

In the 9 year period 1925–1933, 895,680 injections of typhoid vaccine were given. As a result of these injections there were 1 death and 10,898 reactions. Some type of reaction followed slightly more than 1 per cent of the injections.

In the 10 year period 1924–1933 there were 73 cases of typhoid fever among persons who had received 3 or more injections of typhoid vaccine.

Less Lead Permitted on Apples and Pears

IN a notice addressed to both consumers and producers of apples and pears, Secretary of Agriculture Wallace announced a further restriction in the quantity of lead residue permitted on these fruits in interstate commerce. The tolerance specified for the crops of 1935 is 0.018 grain of lead to a pound of fruit.

The reduction was made despite requests from some quarters that the restrictions be relaxed, the Secretary adding that "expectation of continued progress downward is fully justified" and "relaxation in the lead restriction would be wholly incompatible with public safety." U. S. Dept. of Agriculture, *Press Release*, Jan. 25, 1935.

Efficacy of Typhoid Prophylaxis in the United States Army*

MAJOR GENERAL ROBERT U. PATTERSON

The Surgeon General of the U. S. Army, Washington, D. C.

BEFORE discussing the efficacy of typhoid prophylaxis, or so-called typhoid vaccination, it is desirable to refer to the history of the procedure and then trace its development up to the present time.

As early as 1886, Fränkel and Simmonds [1] found that several small nonlethal doses of typhoid bacilli would protect rabbits against subsequent fatal doses. In the same year, Beumer and Peiper [2] immunized mice with potato cultures of typhoid bacilli, and by using small but increasing doses they were able to give definite protection subsequently against what ordinarily would have been fatal doses. They suggested the use of sterilized or killed cultures to be used for the immunization of men, but made no investigations or experiments themselves. Chantemesse and Widal,[3] in 1888 Sanarelli, and others reported work on animals of similar character, but as practically nothing was then known of the toxin of the typhoid bacillus or of the nature of typhoid immunity, little or nothing came of their work. In 1892, Brieger, Kitasato, and Wassermann [4] demonstrated that it was unnecessary to use living bacilli, since killed cultures were equally effective, and that the immunizing substance was an integral part of the body of the bacillus. Both filtrates, which had been used to some extent up to that time, were effective only in so far as they contained particles of bacterial cells.

All of the earlier work on animals was incomplete and unsafe as a guide in the immunization of man, as at that time there was no way of detecting changes in the blood serum after inoculation and, consequently, no way of knowing that protection had been conferred. It was not until 1894 and 1895 that Pfeiffer,[5] working with Wassermann, Kolle, and Issaeff, discovered the nature of the immunity in cholera and typhoid and at the same time elaborated a method of measuring its quantity. They recognized that the character of the immunity and its degree depended upon the presence of bacteriolytic immune bodies in the blood serum, and the test formulated at that time has since become classic under the name of the "Pfeiffer phenomenon." The test is made by inoculating a series of guinea pigs intraperitoneally with fatal doses of cholera or typhoid mixed with diminishing quantities of immune sera followed by examination of the peritoneal exudate for signs of degeneration in the bacteria. If they are dissolved and the pigs live, the phenomenon is present; if the bacteria are not attacked the pigs die and the test is negative. Until the discovery of agglutinins and, later, of opsonins, the entire fabric of

* Read at the Third Annual Meeting of the Southern Branch, American Public Health Association in San Antonio, Tex., November 14, 1934.

proof of the efficacy of immunization depended upon the demonstration of bacteriolytic amboceptors in the blood serum. The results obtained by this test proved conclusively in both animals and man the possibility of producing a high degree of immunity against typhoid by the use of killed cultures.

The first actual immunization of men for the purpose of protecting them against typhoid was made by Pfeiffer and Kolle [6] in 1896. They immunized two men and investigated the specific changes in the blood serum thoroughly and exhaustively. They showed that not only were agglutinins produced, but what is more important, the bacteriolytic power of the blood was also raised in the same way as during an attack of typhoid. So far as was known then, we had the same antibodies produced as the result of inoculation as were produced during an actual attack of the disease. It was therefore not unreasonable to expect that the immunity conferred by prophylactic inoculation would last for a considerable period.

Sir A. E. Wright,[7] who in 1896 was connected with the Medical Corps of the British Army, had injected killed cultures of typhoid bacilli into two men a few weeks before Pfeiffer and Kolle, but the inoculations were apparently made in the course of investigation on the coagulability of the blood, since he reported no studies of the specific changes in the blood. In the next year (1897),[8] however, he published the results of antityphoid inoculations upon 18 men and became convinced by this experience that the method was practicable and that it gave sufficient protection to make it worthy of adoption in the Army.

In 1898, Wright introduced typhoid prophylactic inoculation into the British Army in India, with results which were on the whole very good and encouraging. Wright used broth cultures which had been incubated for 3 weeks and then killed by heating to 60° C. for 1 hour. The size of the dose used was the quantity required to kill a small guinea pig.

During the Boer War, Wright recommended that the troops be inoculated. Four hundred thousand doses were furnished, but it is not known how many received the vaccine. Statistical reports were poor, the opinions of organization surgeons differed, and although Wright was convinced from the data he had collected that both morbidity and mortality were reduced, the procedure was not popular.

Sir William Leishman [9] says relative to the Boer War experience:

> The methods then employed in the preparation of the vaccine may have resulted in considerable variations in its vaccinating efficiency. Some men may have received but slight and transient immunity, while others were protected in as high a degree as the system was capable of.

No doubt overheating the vaccine was one of the main factors in obtaining lack of uniformity of results.

Following the Boer War, the next extensive use of typhoid vaccine was in the German Colonial Army in South Africa from 1904 to 1907. In 1904 the Germans had 226 cases of typhoid among their troops and, upon the advice of Professor R. Koch, prophylactic vaccination was employed with the result that the number of cases fell to 43 during 1907.

Kuhn [10] has reported the results of this work which may be summed up as follows:

> Sixteen thousand four hundred and ninety-six men were sent to the Colonial Army. A call for volunteers resulted in 7,287 men being vaccinated. Large doses of vaccine were given and reactions were severe. One thousand two hundred twenty-seven cases of typhoid developed; among the unvaccinated the percentage of cases was 9.84, and among the vaccinated 5.09.

Figures I and II give the result of this work.

FIGURE I

TYPHOID PROPHYLAXIS

GERMAN AFRICAN EXPERIENCE 1904–1907

— KUHN —

Severity of Cases in Unvaccinated and Vaccinated

	Unvaccinated		*Vaccinated*	
Type of Case	*No.*	*Per Cent*	*No.*	*Per Cent*
Light	331	37	186	50
Moderately severe	225	25	96	26
Severe	234	25	65	18
Fatal	116	13	24	6

Early in the experimental work it was found that the age of the vaccine had considerable effect upon its immunizing properties. This no doubt accounted for some of the failures during the Boer War.

The strain of organism used by Leishman in his work was taken from a spleen at autopsy and was so old that it was thought at that time to have little virulence. Even in the early days there was some controversy as to whether or not a virulent or nonvirulent strain should be used. Wassermann and Strong both showed that virulence had little to do with producing antibodies in animals. Leishman confirmed this work and stated that vaccine made from virulent strains produced much greater constitutional reactions among those inoculated.

When vaccination was reintroduced into the British Army after 1904, Leishman reported the results in India among 19,000 troops, about half of whom were vaccinated. The case incidence among the vaccinated was 5.39 per 1,000, while among the unvaccinated it was 30.4. The case fatality among the vaccinated was 8.9 per cent, among the unvaccinated 16.9 per cent.

In 1908, Captain F. F. Russell, Medical Corps, U. S. Army, was sent to Europe to make a study of the methods of inoculation for typhoid fever in use in England and Germany. Upon his return a board of officers was organized to investigate the advisability of immunizing our own Army. In addition to the Surgeon General and Russell, a number of prominent medical men, members of the Reserve Corps, were made members of the board. The board was actually composed of Surgeon General O'Reilly, as President, Captain F. F. Russell, Victor C. Vaughan, Simon Flexner, William C. Councilman, John H. Musser, Alexander Lambert, and William S. Thayer. Thus, with the exception of two members of the Regular

FIGURE II

TYPHOID PROPHYLAXIS

GERMAN AFRICAN EXPERIENCE 1904–1907

— KUHN —

Relation of Severity of Case to Number of Doses of Vaccine Administered

Type of Case	*One Dose*	*Two Doses*	*Three Doses*
Light	31.7%	48.9%	19.4%
Moderately severe	23.9%	48.9%	27.1%
Severe	41.5%	43.1%	15.4%
Fatal	58.3%	33.3%	8.3%

FIGURE III

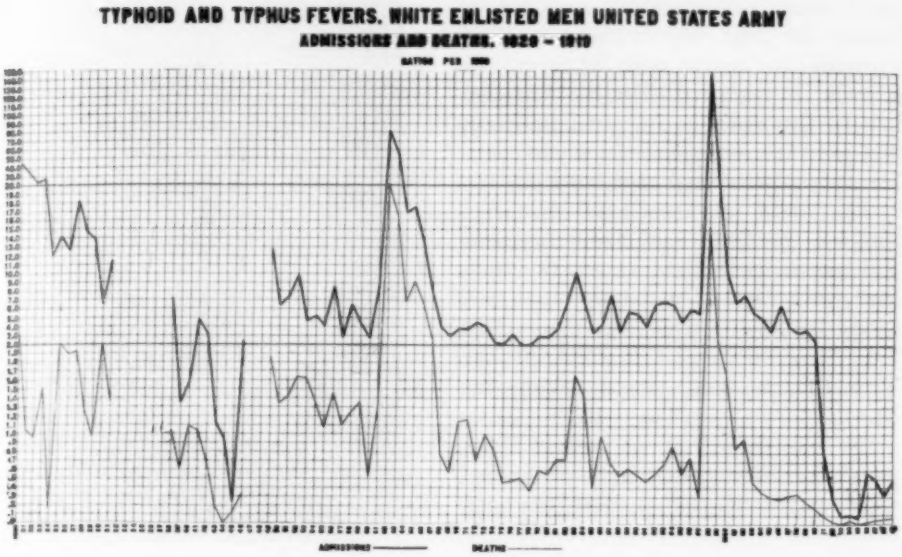
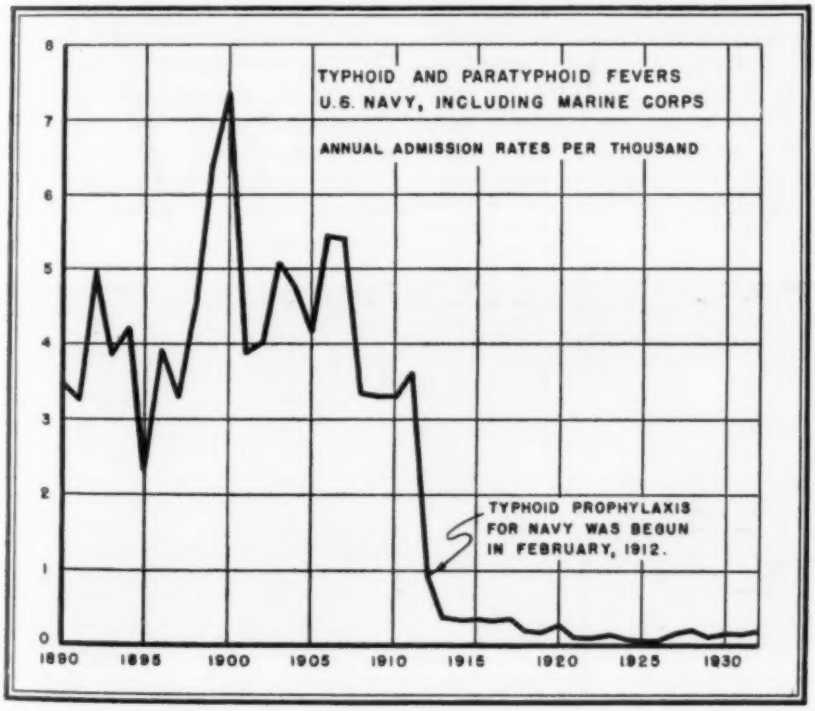


FIGURE IV



Army Medical Corps, the board was composed of leaders of the medical profession in civil life, who gave their valuable time to this work for more than a week, at very considerable financial loss to themselves, as a patriotic duty. Not only the Army but the whole country owes a great deal to these men.

The board was convinced that vaccination was both useful and harmless and recommended its introduction into the Army as a voluntary measure, especially among what was then called "the Hospital Corps" of the Army, the Nurse Corps, and troops taking the field.

On June 14, 1910, 92 men of Company A, First Battalion, Engineers, were vaccinated. On June 24, the company left Washington for Gettysburg, Pa., for maneuvers. The total strength of the company was 118 men. Ninety-two had received at least 1 dose of typhoid vaccine, 2 gave a history of typhoid, leaving 24 unprotected. On August 11, 5 days after returning home, 2 cases of typhoid appeared among the unvaccinated, and 4 others developed between the 20th and 23rd of that month, also among the unvaccinated. No cases developed among the vaccinated, while 25 per cent of the unprotected developed the disease.

FIGURE V—CAPTAIN F. F. RUSSELL

The first volunteers to take typhoid prophylaxis were medical officers stationed in and around Washington in the spring of 1909. Russell then desired to have it introduced among the troops. The first *organization* of the Army to submit to typhoid prophylaxis was Company C of the Hospital Corps, in the spring of 1909. At that time, as a Captain of the Medical Corps, I was in command of that company and Russell

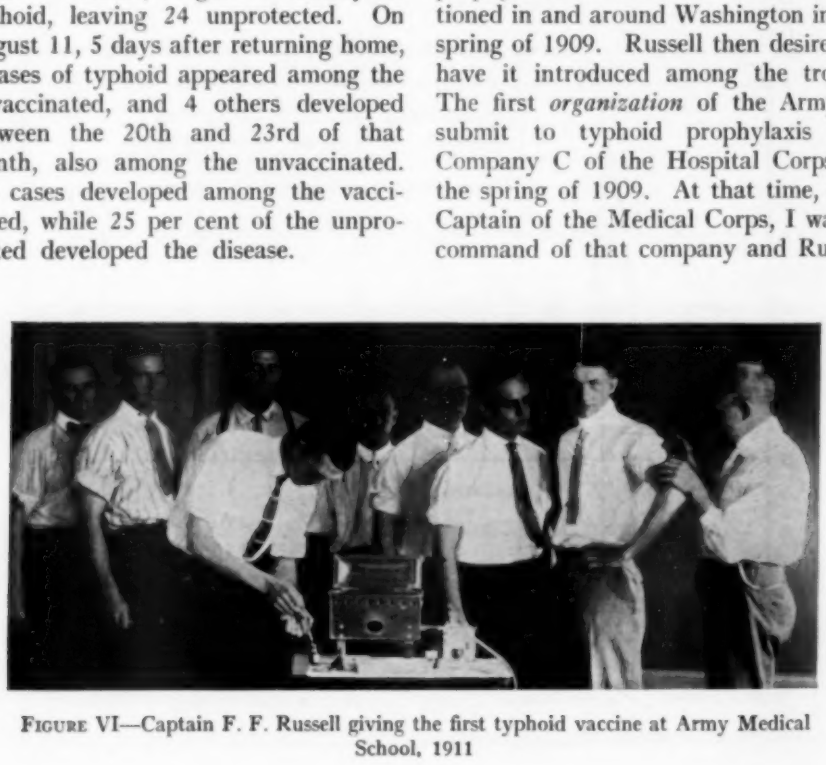


FIGURE VI—Captain F. F. Russell giving the first typhoid vaccine at Army Medical School, 1911

asked me to try to get all the men to submit to the prophylaxis. The First Lieutenant of the organization was Mahlon Ashford (now Colonel, Medical Corps). There was no difficulty in persuading the men to take the complete series of injections, following a short address in which I explained to them the seriousness of typhoid fever, its mortality rate and some of the sequelae, and the expected beneficial results if the practice advocated by Russell were followed. Lieutenant Ashford gave me an injection and, in turn, I gave him one. Seeing the officers take it first no doubt was a factor in leading the men to submit themselves to the experiment. Ninety-five per cent of our company took the inoculation. They were promptly followed by Companies A and B of the Hospital Corps which, in turn, resulted in many officers and enlisted men of the line of the Army submitting to the inoculation.

In 1911, 2 brigade and 1 division maneuver camps were established in the southwest and vaccination was made compulsory among those troops. The results were excellent, and compulsory vaccination for the whole Army under 45 years of age was put into effect by General Order No. 134, War Department, September 30, 1911.

Figure XI presents graphically the number of cases and the deaths from typhoid fever beginning with the year 1897, through the years of the Spanish-American War, the World War and up to the present time. During the World War, in a mean annual strength of 4,128,479 men in the Army, there were only 1,529 cases of typhoid fever with 227 deaths. The distribution of these cases is shown in Figure X.

During the last 10 years we have had only 83 cases of typhoid fever in the Army. About a quarter of these occurred in 1931 among men of one battery of field artillery engaged in a practise march in the middle west, during which hygiene was neglected. An analysis shows that in 14 there was no record of vaccination. Someone had "slipped up" when they were enlisted.

TYPHOID IN THE CIVILIAN CONSERVATION CORPS

The Civilian Conservation Corps came into being early in 1933. Men were examined at Army stations, vaccinated against smallpox and typhoid, and then sent to over 1,000 camps throughout the country, many of which were in endemic typhoid areas.

During the calendar year 1933, it is estimated that 450,000 men were in these camps at various times. The average strength for the 39 weeks was about 223,000, but many remained a short time or left at the end of their 6 months' service. Among this number there were 54 cases of typhoid fever with 4 deaths. Twenty-nine cases, with 1 death, occurred among men of one company in Texas, where working parties had used untreated water from shallow wells under very unsanitary conditions. An inspector stated:

> Conditions in the environs of this house are indescribable and it is known that one case, at least, drank water in this house. It is also known that several of the men who are now infected and suspected, at least, drank from a spring from the northern slope, and that several others waded and even bathed in the stagnant puddles on the work site, although they admitted having been warned against the above.

While food and water were taken to these men by truck daily, in the ravine near their camp was a water course, to which the inspector refers, and which consisted mainly of stagnant pools. A few inhabitants lived along the ridges, poor people without any sanitary conveniences. In one wretched house lived a family of 7. All wastes of every description were freely thrown out or placed on the surrounding ground. In one house a year before there had been 2 cases of typhoid fever, with 1 death,

FIGURE VII

WHAT MIGHT HAVE HAPPENED FROM TYPHOID FEVERS DURING THE WORLD WAR HAD THE RATES BEEN THE SAME AS DURING PREVIOUS WARS

Number of Cases and Deaths

	As Actually Happened During the World War	*As Might Have Happened During the World War, Based on Annual Rates per 1,000 Strength During the*		
		Civil War	*Span. Am. War*	*Phil. Ins.*
Cases	1,529	143,052	623,607	47,849
Deaths	227	48,757	65,313	6,358

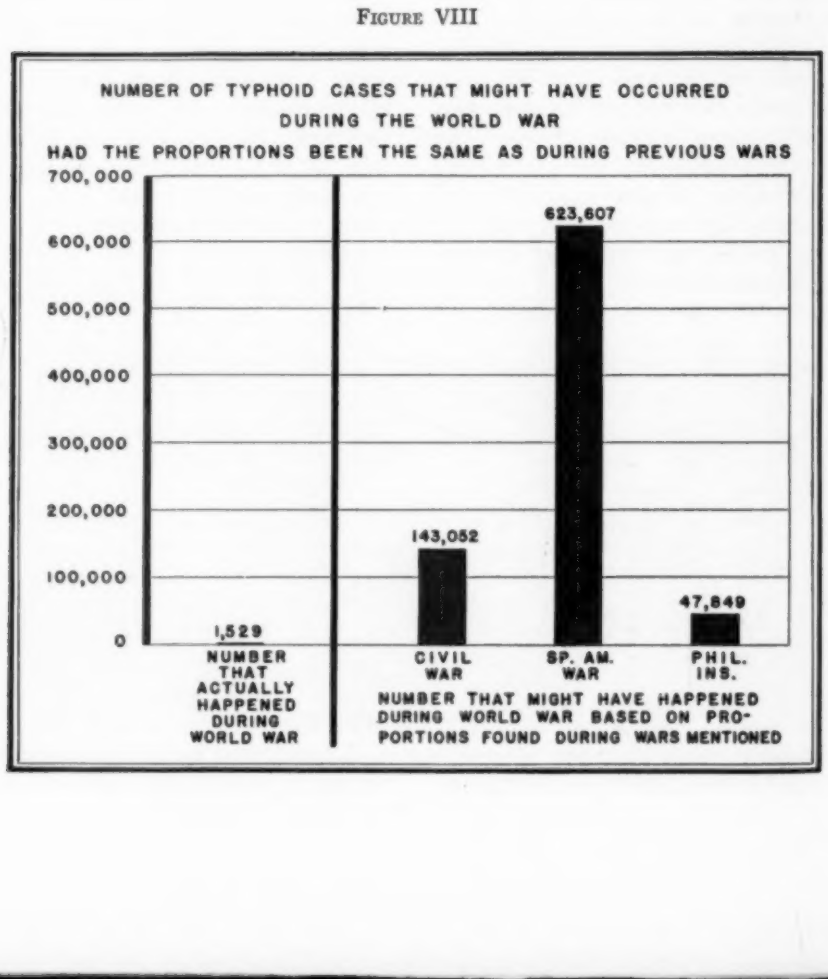
and laboratory tests showed that carriers were then living in this house.

When the Army began to make vaccine at the Army Medical School in 1909, a sub-strain of the Rawlins strain used by the British was obtained.

Much thought had been given to the selection of a proper strain by the British, particularly Leishman. The reasons for selecting this strain were (1) low toxicity for guinea pigs and man, (2) satisfactory stimulation of certain antibodies, (3) produced uniform diffuse growth and was not agglutinated by normal salt solution.

Beginning in 1917, and from time to time since then, the efficacy of the Rawlins strain has been questioned. Weiss [11] challenged it on account of its inability to ferment xylose as a number

FIGURE VIII



of other strains did. This matter was cleared up later by showing that certain strains were slow fermenters and acted through the formation of "daughter colonies." Following this, objection was made because the so-called somatic or "O" type antigens were not produced in man in such concentrations as are observed after recovery from typhoid. That the titer of these "O" antibodies has a direct bearing on immunity is probably erroneous.

The latest objection to the vaccine grew out of a recent controversy as to the effectiveness of vaccine prepared from the so-called "rough" and "smooth" strains. Recently it has been shown that a strain of typhoid organisms may be made to produce either "rough" or "smooth" colonies under certain laboratory conditions. It may be interesting to cite a few cases where living typhoid bacilli were taken into the mouth in the laboratory:

In a case observed by Grant in 1921, an assistant working in the Eighth Corps Area Laboratory of the Army sucked into his mouth 0.5 c.c. of a heavy suspension of living typhoid culture strain K110. His mouth was washed out with 50 per cent alcohol and he was given 0.5 c.c. of Army vaccine. Four days later he developed headache and malaise, but there was no fever or other symptom except slight headache on the 8th day. Typhoid bacilli were isolated from the feces on the 12th day after the accident, and again on the 3 succeeding days, but none were found in the blood. This man had received the U. S. Army vaccine fourteen months previously.

In 1922, Sergeant George F. Luippold, Medical Department, while working in the Vaccine Department at the Army Medical School, swallowed approximately 25 c.c. of a saline suspension of the U. S. Army Rawlins culture containing about 3,000 million organisms per c.c. After rinsing his mouth with a cresol solution and with alcohol, he was given a subcutaneous injection of vaccine and kept in bed for one week. Cultures of stool, urine, and blood taken during this week were negative. On the 4th day he developed a temperature of 101, which disappeared after 2 days, and aside from a sore throat there were no other symptoms. Prior to this accident, the Sergeant had received three complete courses of Rawlins vaccine, the last one 2 years previously, in 1920.

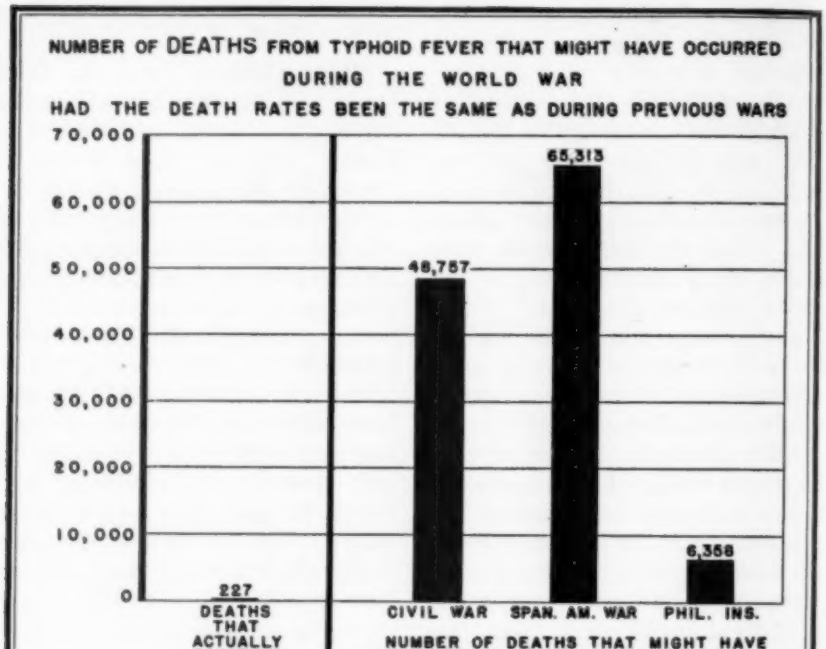
Major General Harry L. Gilchrist (retired), formerly Chief of the Chemical Warfare Service, and Colonel E. B. Vedder (retired), now Professor of Preventive Medicine at George Washington University, with 6 privates of the Medical Department, became ill with typhoid fever in August and September, 1904, during experiments with typhoid vaccine, being made to prove that killed broth cultures ingested were harmless. Unfortunately, they had not been heated at a high enough temperature to sterilize them, with the result that these 8 men contracted typhoid fever. Happily, there were no fatalities. General Gilchrist, at that time Captain in the Medical Corps, to encourage the men to take the dose with him, took twice the quantity taken by any of the others.

From the time of its introduction until July, 1917, the Army vaccine consisted of a saline suspension of the Rawlins strain grown on beef extract agar and killed by heating to between 53 and 54° C. for an hour. The vaccine was standardized at 1,000 million organisms per c.c. by the Harrison method, in which washed red blood cells were used for comparison. Later it was shown that by this method the actual bacterial count is only about one-half that of the count estimated by this method, so that during this period the vaccine consisted of approximately only 500 million organisms per c.c.

In July, 1917, 750 million paratyphoid "A" organisms and a like amount of paratyphoid "B" were added, Harrison's method of counting being used.

In July, 1919, the direct method of counting in a Helber chamber was adopted, which resulted in doubling the quantities of each component of the vaccine; and in April, 1920,

FIGURE IX



the nephelometer was introduced, using standards established by counts in a Helber chamber. The standards became more and more opaque with age, resulting in increasingly higher contents of the vaccine. This was not recognized until some time in 1923. Meanwhile the reactions had become so severe that in February, 1922, the paratyphoids were reduced to 500 million each, but as this was estimated by the nephelometer, there actually remained almost 1,500 million paratyphoid organisms. When the error in this method of counting was discovered in 1923, the actual count was approximately 1,750 million typhoid and a like number of paratyphoid organisms, a strength of 3,500 million as compared with the prescribed strength of 2,000 million. In March, 1924, vaccine was issued in which the direct count was 500 million typhoid and 250 million each of paratyphoid "A" and "B." At this time the Navy discontinued the paratyphoid fraction entirely and their vaccine was standardized at 1,000 million typhoid organisms and has been held at that since. The method of preparation of the vaccine at this time was also changed. Veal infusion agar was substituted for beef extract media and the killing point increased to 56° C. for 1 hour. In October, 1927, the paratyphoid "B" fraction for Army personnel was also discontinued and the typhoid fraction increased to 750 million per c.c. Beginning on April 1, 1934, the paratyphoid "A" fraction was discarded and the typhoid fraction increased to 2,000 million. This monovalent vaccine is the one now in use in the service. Recently, after an extensive investigation at the Army Medical School, Hawley and Simmons have come to the

FIGURE X

TYPHOID FEVER

DISTRIBUTION OF WORLD WAR CASES

Race, Rank and Country	*Cases*	*Rate per 1,000*	*Deaths*	*Death Rate per 1,000*
Total officers	49	.24	7	.03
Enl. white, U. S.	483	.25	54	.03
Enl. colored, U. S.	45	.31	17	.11
Enl. white, Europe	776	.53	123	.08
Enl. colored, Europe	23	.19	8	.07
Color not stated, Europe	59	...	13	...
Enl. white, Hawaii	50	3.09	4	.25
Enl. other countries and on transports	42	...	1	...
Native troops	2	.06	...	...

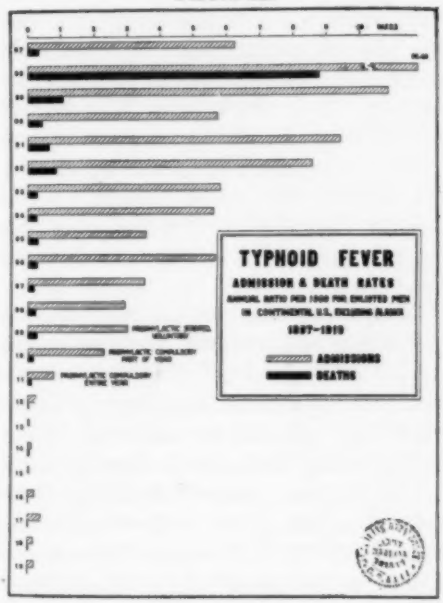
There were no cases in Panama or Philippines among the white or colored troops.

conclusion that the Rawlins strain *may not be* the best typhoid vaccine strain, but it is their belief that the sub-strain used at the Army Medical School is no worse today than it ever was; nor has it been proved that the present state of this sub-strain is not the optimum for the prevention of typhoid fever in man, or that when the optimum dissociative state has been determined the Rawlins strain cannot be so maintained.

The new vaccine was issued so that it could be put into effect all over the country on April 1, 1934. Corps Area Surgeons were instructed to submit reports relative to the severity of reactions, etc., as compared with the old vaccine. As a result, a mass of material has been accumulated which is now being analyzed in my office.

Some reports state that it causes more reactions, and some less, while many note no difference. One of the most comprehensive reports (Fort Sheridan) shows a comparison between the old type of vaccine used at the second C.C.C. enrollment and the new which was used at the third. The figures are as follows:

FIGURE XI



The Surgeon submitting this report states:

It is believed that the hospital admission rate does not reflect adequately the decreased toxicity of the new vaccine, as among men sent to hospitals the subjective symptoms were apparently much less disagreeable and the evidences of prostration were much milder than was formerly the case.

	Number of Men Vaccinated	*Number Admitted to Sick Report as Result of Reactions*	*Rate per 1,000*
Second Enrollment	10,984	138	11.74
Third Enrollment	7,873	74	8.21

There seems to be considerable evidence that when reactions occur, they usually follow the second dose rather than either the first or third.

The result of typhoid prophylaxis in the United States Army is indicated most graphically in Figures VII, VIII, and IX.

During the World War more than 4,000,000 men were mobilized and among that great number there were but 1,529 admissions to sick report as the result of typhoid fever, or 1 admission for every 382 that occurred during the Spanish-American War in an Army averaging less than 207,000. Instead of our camps during the World War being hotbeds of infection, they were almost free from typhoid fever. In Manila, P. I., during the War Period (1917–1919 inclusive), there was but 1 case of typhoid fever among all the American and native troops, while among the civilian population there were 1.8 per 1,000 during each of these 3 years.

The man most responsible for this wonderful achievement, resulting in the saving of thousands of lives and the prevention of needless suffering to thousands of others, an accomplishment which was a real contribution in maintaining the man-power and the effectiveness of our Army during the World War, was Frederick F. Russell. He was the leader whose report of his observations and studies in Europe in 1908 convinced the board of distinguished scientists of the desirability and practicability of the introduction of killed cultures of typhoid bacilli as a means of producing protective immunizing bodies in man. The complete demonstration of the efficacy of this procedure in our Army on such a large scale served also to convince other armies of its value, and it was early introduced by the civil profession into their practice. In these days it is being carried out more and more as a routine public health measure.

While we are never justified in relaxing our general sanitary measures for the prevention of this disease, and it is known that at times typhoid prophylactic vaccination will not afford complete protection, particularly so against a gigantic or very virulent focus of infection, nevertheless when troops *do* contract typhoid fever in spite of prophylactic vaccination, the death rate is practically nil.

I have referred to the conclusions of Hawley and Simmons in " The Effectiveness of Vaccine Used in the Prevention of Typhoid Fever in the U. S. Army and Navy," in July, 1934, *American Journal of Public Health*. In view of their conclusions, it was the opinion of our immunologists that the Army vaccine could be improved by increasing its bacterial content, within the limits of safety. That is the reason we have reverted to a monovalent vaccine, as used between the years 1909 and 1917, though it is now more potent. To date the results have been excellent, as shown by its effectiveness among the large number of men who have been enlisted in the Army, and in other groups in this country.

The Director of Laboratories of the Army Medical School and his assistants are engaged in a series of careful investigations concerning the efficiency of the Rawlins strain now in use in our Army, with a view to ascertaining whether the same strain should be continued or a new one developed. This work will be carried on continuously over a long period. The present strain is working very satisfactorily wherever used in this country. However, there may be room for improvement, and the work indicated is going forward to reach a determination of this question.

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Sickness Insurance of School Children in Switzerland

SICKNESS insurance of school children, as a supplement to insurance of adults, is required by law in 8 of the 25 cantons of Switzerland, among them Geneva and Saint Gallen; in 7 other cantons, including Bern and Zurich, such insurance is required only in some communes. In several cantons the insurance law applies only to children attending kindergarten or elementary public school; in others it applies to all children of certain ages, whether they attend school or not.

Each insured child pays into the insurance fund about 15 to 20 francs annually ($2.80 to $3.80); in case of poverty the payment is made by the commune; in addition the Federal Government and the cantons contribute together about half of this amount.

The purpose of the insurance is to provide medical attendance and medicines in case of illness or accident; also when necessary special kinds of treatment, such as ultraviolet-ray, X-ray, or orthopedic. Undernourished children and those in need of recuperation or rest are sent to special resorts in the country or in the mountains. Parents or guardians failing to insure their children or wards are subject to penalties.

The number of insured children increased from 25,000 in 1914, when the social insurance law of 1911 went into effect, to 338,000 in 1932. According to recent reports from Switzerland, the system of children's insurance has been working well. The expected reserves have been accumulated; large numbers of children have been sent to rest homes; and the sick children have been supplied with all the necessary treatment.—*Le Assicurazioni Sociali*, Rome, vol. 10, No. 1, 1934.

Epidemiological Studies on Relapsing Fever in California*

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RELAPSING fever is an acute infectious disease characterized by attacks of fever followed by remissions during which the patient feels quite well, only to be seized again by relapses. The onset is generally acute, with chills, high fever, intense frontal headache, and excruciating pains in the back, limbs, and joints. Nausea and vomiting may occur and prostration is marked. The attack lasts from 2 to 4 days and is usually terminated by crisis, the temperature falling rapidly to normal with profuse sweating, and within a few hours there is an apparent restoration to health. The afebrile periods last from 3 to 12 days. Without specific treatment there are generally 2 to 4 attacks, occasionally as many as 8, each of decreasing severity. One injection of neoarsphenamine is considered sufficient to effect a complete cure. In California the disease may be confused with influenza and malaria. However, there is a leucocytosis in relapsing fever and quinine has no effect on the course of the disease.

Relapsing fever is caused by *Treponema recurrentis*. This organism is a long slender flexible spiral filament, tapering at both ends. It is 10–20 microns long and usually has about 8 undulations, occasionally as many as 10 or 12. Long chains are sometimes observed, being arranged end to end. It is actively motile. The laboratory diagnosis of relapsing fever is either by blood smears or animal inoculation. The blood smears may be stained by the methods of Wright, Giemsa, or gentian violet. These methods are satisfactory during the febrile period when the organisms are usually found in abundance, but during remissions or at other times when they cannot be demonstrated by stains it is necessary to resort to animal inoculation. The patient's blood may be immediately inoculated into white mice or may be shipped as clotted blood to the laboratory. Our observations show that the spirochetes remain viable un-iced for as long as 6 days.

In the California group of cases there have been no serious complications or sequelae and no deaths. This is in contrast to the epidemic louse-borne type seen in the Old World where the mortality may be as high as 50 per cent or more.

While the disease is very common in various parts of the world and often reaches epidemic proportions, there have been relatively few cases in the United States. In 1844 [1] the first cases were reported in Philadelphia, and for a number of years the disease appeared in Eastern United States, where the last epidemic was reported in 1869.

* Read before the Epidemiology Section of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 3, 1934.

TABLE I

RELAPSING FEVER IN CALIFORNIA

CASES BY YEARS

Year	*Number of Cases*
1921	2
1923	1
1925	1
1927	2
1928	1
1930	4
1931	12
1932	16
1933	19
1934 (to Aug. 18)	11
Total	69

In 1875, Dr. P. B. M. Miller gave an account in the *Pacific Medical and Surgical Journal* [2] of an epidemic of relapsing fever among Chinese laborers at Oroville, Calif. This prevailed during the months of August, September, and October, 1874, and it was estimated that there were several hundred cases. No further mention is made in the literature of this disease in California until 1906, when 2 deaths were recorded in the *19th Biennial Report* of the State Board of Health [3] and in 1907, 1 death was reported in the *20th Biennial Report*.[4] There is no comment on these deaths as to the geographic distribution or laboratory diagnosis.

The first proved cases were described by Dr. LeRoy Briggs [5] of San Francisco, in 1921. These patients were infected at Polaris, near Lake Tahoe. They were proved positive by blood smear examination. Reports of one or two cases yearly are on record in the files up to 1930, when 4 were brought to the notice of the California State Department of Public Health. In July, 1931, the State Board of Health, recognizing the public health importance of the disease, passed a resolution making it reportable and to date (August 18, 1934), 69 cases have been recorded.

In Table I the group of cases shows twice as many males as females, which is comparable to the incidence in the Old World. There, the variation is attributed to differences in chances of ex-

TABLE II

RELAPSING FEVER IN CALIFORNIA

CASES BY MONTHS OF ONSET

Month	*Year* 1921	1923	1925	1927	1928	1930	1931	1932	1933	1934	*Total*
January	..	..	..	..	..	..	..	..	..	..	..
February	..	..	..	..	..	..	..	1*	1†	..	2
March	..	..	..	..	..	..	..	..	..	..	..
April	..	..	..	..	..	..	..	1‡	..	..	1
May	..	..	..	..	..	..	..	..	..	1	1
June	2	..	..	1	1	..	1	3	6	2	16
July	..	..	..	..	..	3	9	5	6	6	29
August	..	..	..	..	..	..	2	5	6	2	15
September	..	1	1	..	..	1	..	1	..	..	4
October	..	..	..	..	..	..	..	..	..	..	..
November	..	..	..	..	..	..	..	..	..	..	..
December	..	..	..	..	..	..	..	..	..	..	..
Unknown	..	..	..	1	..	..	..	..	..	..	1
Total	2	1	1	2	1	4	12	16	19	11	69

* Owner of fox farm. Pelting done in February
† No laboratory confirmation
‡ Laboratory infection

MAP A

RELAPSING FEVER IN CALIFORNIA

CASES BY GEOGRAPHIC DISTRIBUTION IN MAN

1. Packer Lake District	2
2. Lake Tahoe District	22
3. Strawberry Lake District	1
4. Big Bear Lake District	41
California (Source unknown)	2
Laboratory Infection	1
Total	69

California State Dept. of Health

posure but in our series of cases no such explanation is plausible. All ages from 4 years to above 55 are represented.

According to dates of onset the majority of cases occur in June, July, and August. This is also true in Texas, as contrasted with the epidemic louse-borne form which is more prevalent in the winter months. The occurrence of cases runs practically parallel with the appearance and disappearance of rodents. Table II shows the cases by years and months of onset. Two cases are recorded in February. One of these patients owned a fox farm. The animals are pelted in February and during the process the operator receives many scratches and cuts. It is possible the infection was passed by direct transmission from these foxes. This was not proved, as blood was not obtained from these animals at the time of pelting. The second case reported in February was not confirmed by laboratory methods and is open to question. The April case was contracted through a

laboratory accident. One case had its onset in May, 1934, but this year the season was far more advanced than normal which may account for this.

The geographical distribution of human cases is of decided epidemiological interest (see Map A). Sixty-six of the cases recorded have occurred in 4 foci of the state: Lake Tahoe, Packer Lake, Strawberry Lake, and Big Bear Lake. These districts, as may be noted on the map, are in widely separated mountainous sections at elevations of 5,000 feet and over. The topography in all is similar. The mountains are heavily wooded and abound in animal life. The winters are rather severe with heavy snowfall usually lasting until late May or early June, while the summers are warm and pleasant, which makes these districts popular as resorts. Many wealthy people have summer homes around the lakes. The dates of onset of recorded cases correspond roughly to this seasonal change, to the return of animal and insect life, and to the sudden increase in population due to the influx of those on vacation. There is considerable evidence that the disease has long been established and is prevalent in these areas, as the natives speak of "squirrel fever" which is undoubtedly relapsing fever.

The possibility of an animal reservoir of *Treponema recurrentis* presented itself. Surveys were made in 3 of the foci: Big Bear Lake, Lake Tahoe, and Packer Lake in an attempt to determine the animal reservoir and the agent that may transmit the disease (Map B). The field work was started in the spring as soon as weather conditions permitted and the rodents were present in sufficient numbers. A mobile laboratory unit was used. Table III gives a summary of the rodents examined. Included under "other animals" were tree squirrels, Oregon fuzz-tail squirrels, rabbits, rats, mice, fitch, fox, woodchuck, weazels, bats, and birds. A total of 905 animals were examined for the presence of *Treponema recurrentis* in the two surveys 1931 and 1932. In the 1932 survey, 13 strains of spirochetes were isolated from these rodents [7]; 2 strains from tamarack squirrels; and 11 from chipmunks. The same species of rodents were found to harbor spirochetes in the 3 foci investigated.

A comparative study was made of the rodent and human strains to determine if they were identical. Morphologically the organisms from both sources appear to be the same. The field incident in which there appeared to be direct transmission of spirochetes from a tamarack squirrel to a member of the survey crew offers further proof that the two strains, animal and human, are identical.[6, 7] Mr. X accidently contaminated an open

TABLE III

RELAPSING FEVER IN CALIFORNIA

RODENT SURVEY

	Big Bear		*Lake Tahoe*		*Packer Lake*		
Animal	1931	1932	1931	1932	1931	1932	*Total*
Chipmunk	44	134	66	151	17	21	433
Golden Mantled Ground Squirrel	29	17	51	109	1	10	217
Ground Squirrel	27	13	47	64	5	3	159
Tamarack Squirrel	..	..	9	8	10	6	33
Other Animals	3	32	15	3	2	8	63
Total	103	196	188	335	35	48	905

wound on his hand with blood from a squirrel recently shot, which later was proved positive for spirochetes. Seven days later he developed a clinical case of relapsing fever and similar spirochetes were demonstrated in his blood. Experimental work now in progress in this department, which will be reported later, seems to support the evidence that the spirochetes found in tamarack squirrels and chipmunks are identical with those found in patients associated with them, and that these rodents act as a reservoir of infection for relapsing fever in California.

Nicolle and Anderson [8] as a result of their extensive observations on relapsing fever in Tunis have developed the interesting hypothesis that blood spirochetes were originally parasites of small burrowing mammals and that rodents commonly serve as animal reservoirs of the disease. This is comparable to our observations, *i.e.*, positive findings in chipmunks and tamarack squirrels.[7] The disease is transmitted

MAP B
RELAPSING FEVER IN CALIFORNIA
GEOGRAPHIC DISTRIBUTION OF RODENTS
1. Packer Lake District
2. Lake Tahoe District
3. Big Bear Lake District
California State Dept. of Health

through the agency of ectoparasites such as various species of Ornithodorus according to the above authors. Clark, Dunn, and Benavides [9] also suggest that relapsing fever is primarily a disease of animals and that man is only an accidental host—probably attacked by ticks as a matter of necessity.

In Texas, relapsing fever is transmitted by *Ornithodorus turicata* [10] and in Panama by *O. talaje* and *O. venezuelensus*.[11] This means of transmission seems to be the most likely in California because of the following facts: (1) the endemicity of the disease, (2) seasonal distribution (3) class of people affected and their living conditions, (4) geographic distribution. The case histories were studied for reports of insect bites. Of the 69 patients 24 reported bites of some description caused by ticks, mosquitoes, fleas, and possibly bed bugs and other insects. In only a few instances could ticks be definitely incriminated. This may be because: (1) the larval and nymphal stages of these ticks are responsible for the transmission; (2) these forms are small in size, having been compared with the seeds of a strawberry; (3) ticks of species Ornithodorus do not remain attached after completing a blood meal; (4) after feeding, these ticks conceal themselves and hibernate, perhaps for months, therefore would be most difficult to find. A series of 5 cases reported in British Columbia [12] gave no history of insect bites, which might indicate that the problem there is similar to ours. As part of the epidemiological study in this state all the animals surveyed were examined for ectoparasites, with negative results except for fleas and lice. The burrows and nests of rodents were searched for ticks as were also the homes of patients. At Lake Tahoe nymphal forms of *O. turicata* were discovered in a cabin where a case had developed, and, associated with a number of cases, nymphal forms of Ornithodorus (identification not completed) were found at Big Bear Lake. *O. coriaceus* was also found at Lake Tahoe. These specimens, however, were so limited in number that very little experimental work could be accomplished, and definite proof that these ticks are infected in nature is lacking in this state.

The California situation seems to be directly opposed to the epidemiological findings in Texas and Tropical America, in both of which places ticks of the species Ornithodorus are very prevalent; the native huts in Panama often yielding large numbers (4,880 specimens from 68 huts) [11, 13] and certain caves in Denton County, Tex.,[10] have supplied ticks in abundance. In California, the ticks are found with great difficulty and never in large numbers. If ticks were as numerous in California as in Panama and Texas, more cases would undoubtedly be reported because of the high incidence of infection found among wild rodents (chipmunks and tamarack squirrels). All indications in California are that the ticks hibernate during the winter with these rodents and become infected from feeding on their hosts, and are disseminated in the spring at the time the rodents become active and leave their nests.

Altitude seems to play a very important part in California, as the cases have been confined to mountainous districts over 5,000 feet in elevation. There is apparently no such limitation to the incidence of the disease in Panama and Texas. The actual elevation, however, is of less significance than the climatic factors present in these particular locations. The wild rodents, chipmunks and tamarack squirrels, in which spirochetes resembling *Treponema recurrentis* have been found are limited to these higher altitudes also, which is strong evidence that they act as the animal reservoir of relapsing fever in this state. On the other hand, the

species of ticks incriminated is probably not limited to the high altitudes. So, in explanation of the peculiar distribution of endemic foci in our state the suggestion is offered that it is determined by the animal reservoir rather than by the transmitting agent.

SUMMARY

1. Relapsing fever has been reported in California since 1874.

2. It is endemic in this state, 69 definite cases having been reported from 1921 to August 18, 1934.

3. Seasonal distribution is marked—the majority of cases occurring in June, July, and August.

4. Sixty-six of the 69 cases have been reported from 4 foci; 2 of the remaining 3 were of unknown source and the third was a laboratory infection.

5. The 4 foci are all mountainous districts over 5,000 feet in elevation and popular as summer resorts.

6. The same wild rodents (chipmunks and tamarack squirrels) have been found to harbor spirochetes resembling *Treponema recurrentis* in 3 of these foci. They probably act as the reservoirs of infection.

7. No definite vector has been determined. Ticks of the species Ornithodorus have been obtained at Big Bear Lake and at Lake Tahoe associated with proved cases of relapsing fever.

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Test for Protective Power Against Yellow Fever

A METHOD of testing sera for protective power against yellow fever is described and designated as the intraperitoneal protection test in mice. The test consists essentially of the inoculation of mice intraperitoneally with yellow fever virus, fixed for mice, together with the serum to be tested, and the simultaneous injection of starch solution into the brain to localize the virus. If the serum lacks protective power the mice die of yellow fever encephalitis.

The test is highly sensitive. Consequently it is useful in epidemiological studies to determine whether individuals have ever had yellow fever and in tests to find whether vaccinated persons or animals have in reality been immunized. When mice were given large intraperitoneal injections of yellow fever virus fixed for mice, the virus could be recovered from the blood for 4 days although encephalitis did not occur. If the brain was mildly injured at the time of the intraperitoneal injection, the symptoms of yellow fever encephalitis appeared 6 days later, but the virus was then absent from the blood. Strains of white mice vary greatly in their susceptibility to yellow fever. W. A. Sawyer and Wray Lloyd. The Use of Mice in Tests of Immunity Against Yellow Fever. *J. Exper. Med.*, 54:533 (Oct.), 1931. Abstract in *J. A. M. A.*, 104, 4:275 (Jan. 26), 1935.

Hydrocyanic Acid Gas and Other Toxic Gases in Commercial Fumigation*

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THIS joint paper summarizes the study made by officials of Detroit and Montreal, working independently, on behalf of their respective health departments, to draw up safe and practical fumigation regulations for the effective destruction or control of vermin.

Fumigation is a process of sanitary significance, in which a lethal gas is confined in an enclosed space, to destroy insect life in all stages and rodents.

GENERAL CONSIDERATIONS

Theoretical considerations related to the subject of fumigation, such as the laws of gaseous diffusion, the penetrating power, and the stratification of gases, etc., will be referred to but will not be discussed. In this respect, sanitarians must depend upon the available scientific data, although heterogeneous in nature, based on fundamental principles, but which must be interpreted and applied, to the view of safeguarding human lives.

The conditions of fumigation, save for climatic differences or variations, are relatively the same in all cities; but no standardized regulations are yet existent in the United States and Canada. Because this material is not available, much study is required to correlate the useful information on the subject, especially that on warning gases, which has been the subject of considerable controversy in the past few years. In a study of this nature, it is logical to include the fumigants under consideration among the known noxious gases, and, to this end, no better classification is available than that given by Henderson and Haggard [1] who have placed cyanide gases used in commercial fumigation among the group of asphyxiants, the latter group being subdivided into "simple asphyxiants," or physiologically inert gases, like nitrogen and hydrogen; and "chemical asphyxiants," or substances which, by combining with the hemoglobin of the blood, stop oxidation in the living tissues, so that the oxygen cannot be utilized and death from asphyxia soon occurs.

Hydrocyanic acid gas (HCN), and cyanogen gas (C_2N_2), being in the class of "chemical asphyxiants," must be handled with great care by competent operators, and according to well established procedure.

Every city of any importance must, sooner or later, in the interest of safety, enact ordinances or regulations to prevent unnecessary fatalities which are due mainly to ignorance or negligence in conducting fumigation operations.

Experience of the past 25 years has

* Read before the Public Health Engineering Section of the American Public Health Association, at its Sixty-third Annual Meeting in Pasadena, Calif., September 3, 1934.

demonstrated the effectiveness of various toxic gases, when employed as fumigants for the extermination or control of pests common to certain classes of industry, and those classed as "household pests," the presence of which is extremely annoying to human beings. Governmental agencies have, from time to time, published bulletins for general distribution in which the recommended methods for the control of various insects, rodents, and pests have been explained in great detail. Poisons, spray compounds, gases of varying toxicities, powders (poisonous and non-poisonous) are the recommended vehicles by which the vermin are eliminated. The information contained in these bulletins has been a great boon to mankind in that it has supplied individuals with the knowledge necesary for the solution of their particular problems. On the other hand, it has stimulated the use of toxic gases, the employment of which is accompanied by greater hazards than the layman understands. Experience has indicated that the promiscuous use of this knowledge has resulted in a loss of life sufficient to prompt official cognizance of fumigation hazards with the enactment of legislation designed to insure greater safety to the public.

We believe that of all the toxic gases employed for exterminating purposes, hydrocyanic acid gas (HCN) is conceded to be the most dangerous. Its deadly character, coupled with the fact that its slight characteristic odor is not detected by the average person, renders any error in the technic of its use extremely hazardous.

Any attempt to discourage the use of a gas that has become more or less the standard for exterminating purposes, on the grounds that there are less hazardous methods of accomplishing results, has met with a great deal of opposition. In the first place, there appears to be a difference of opinion among the better informed as to the necessity for restricting the use of straight HCN, other than to require that its use be subjected to control by licensing operators and its application subjected to strict regulations governing technic.

Detroit was one of the first cities which attempted to control the use of toxic gases in exterminating practices. The first ordinance was enacted in July, 1921. This legislation has been amended several times in an effort to decrease the deaths and accidents attributed to the use of HCN. The regulations in effect for a number of years have embodied the standard requirements, such as: the examination of all persons as to their qualifications before licensing them to employ the gas; the filing of an approved $1,000 indemnity bond; the reporting of every operation to the Department of Health; the complete vacating of the entire independent structure, any portion of which is subjected to the gas; the placarding and guarding of the structure during the period of gasing and ventilation; prohibiting children to reënter until the following morning; a minimum airing period of 2 hours or until all traces of the gas have disappeared and the structure is pronounced safe by the licensed fumigator.

In spite of these regulations, guards are unreliable and inefficient, and unsuspecting persons enter to their death. Persons disregard the caution to keep windows open and in closing them create potential death chambers.

Fifteen deaths have occurred in Detroit since 1921, and in Montreal 8 recorded deaths since 1928, all of which have been positively attributed to HCN in fumigations. During this period it is estimated from available records that no less than 30,000 separate jobs were undertaken in Detroit in which this gas was employed. One death per 2,000 fumigations performed, the approximate average for Detroit, would probably

represent the normal accident expectancy in any community.

The circumstances under which the deaths occurred indicate that negligence of some degree was a contributing factor in every case. There are so many things that may happen on a given fumigating job to create a potential hazard that it is not possible to predict the ones most likely to occur.

If regulations and rules of conduct are made too rigid, there will be no fumigations performed with HCN except those undertaken surreptitiously. This statement is based upon the fact that in the last analysis the cost of exterminating in a given case will determine the method to be employed, provided, the property owner or manager is convinced that the particular method used is to be effective.

Under similar rules of procedure an operator employing cyanogen chloride (CNCl) in fumigation cannot compete with one employing straight HCN on account of the difference in cost of the ingredients, inconvenience in handling, and greater care necessary in sealing the spaces to be fumigated. Straight HCN released by the pot method is without doubt the cheapest, most effective method of exterminating certain household pests.

To contend, as do some exterminators, that there are no other reliable methods available to accomplish comparable results is unwarranted; yet, such assertions have been made before legislative bodies by interests opposed to any interference with the practice of releasing straight HCN for exterminating purposes.

It may be a fact that there are no other methods as effective at the same unit of cost, but, on the other hand, there are no other methods that constitute an equal hazard to human life. The question which is to be settled is, therefore, one of cost as balanced against safety.

Those engaged in the business of exterminating and who employ HCN as the principal fumigant, placing very little reliance on sprays and powders for the effectiveness of their operations, are very anxious to have all persons engaged in exterminating licensed for the purpose of control. It is alleged that the method which they employ are sufficiently hazardous to warrant supervision.

Granted that there is the possibility that roach powders may be so carelessly spread as to poison food or be eaten by infants or small children and that various sprays may create a fire hazard, the Detroit experiences over a period of 13 years have not been such as to place the spreading of insecticides, the use of pyrethrum sprays, or the burning of sulphur in the same category *with the use of HCN*.

The U. S. Public Health Service, under whose jurisdiction ship fumigation is conducted, has experimented with various gases, and from information obtained from the Bureau it is apparent that the authorities are of the opinion that the so-called warning gases are desirable. However, the greatest degree of protection to the public as regards the use of lethal gases for domestic fumigation is, they believe, afforded through the adequate control of the concerns and employees engaged in the business, the products to be used, and the premises in which they are used.

From an analysis of the accidents in Detroit and Montreal over a period of several years, from close observation of the actual effectiveness of CNCl combination with HCN as a practical warning in fumigation, the Detroit and Montreal health authorities have concluded, and are on records, that the use of straight HCN in the fumigation of dwellings for exterminating purposes, should be prohibited, and that lethal gases employed in fumigation be mixed with an approved warning expulsive gas,

or be of themselves warning expulsive gases.

An ordinance in line with this policy was recommended to the Detroit Common Council in July, 1933. To date, objections on the part of commercial fumigators and chemical manufacturers, together with the conflicting opinions of authorities as to the value of warning agents in fumigation, have succeeded in delaying legislative action recommended as a safety measure by the Detroit Board of Health.

Public opinion showed alarm in Montreal over this same matter, during the past few years, and proper legislation was sought. To the Health Department of this city was entrusted the task of preparing and enforcing ordinances, based on the best available scientific information and on the existing legislation.[2] This has brought up important considerations regarding the basic principles of the subject of fumigation, especially of warning gases. It is now hoped that a consensus of opinion on the latter will soon be reached—first, as regards their necessity; second, as regards the relative value of those gases which are in most common use; third, as regards the results obtained in safeguarding human life, with or without the use of warning gases.

STANDARDIZATION

Along the line of standardization of fumigation ordinances, good work has been accomplished by the National Fire Protection Association,[3] and reports have been made at their 1933 and 1934 meetings, held in Milwaukee and Atlantic City respectively. The above regulations which pertain mainly to fumigation hazards, do not contain any reference in regard to the use of warning gases.

This omission may be attributed to the fact that these regulations were drafted with the main view, that fumigation processes introduce fire hazards, as illustrated in Factory Mutual Data sheet 11-91-31:

> Nearly every fumigation process introduces a serious fire hazard, either because the fumigant is flammable and creates an explosive atmosphere or because it is extremely toxic and curtails or prevents effective fire fighting.

The same divergence of opinion exists in regard to the subject of cross-connections in water supplies. Sanitarians require their complete severance, while, for safety purposes, fire protection associations are inclined to permit their use under certain conditions.

The Bureau of the U. S. Public Health Service may take a stand in the near future in reference to the use of warning gases in the fumigation of inhabited buildings, which stand would lead, no doubt, to the standardization of fumigation ordinances.

Provisions have been made in the Montreal fumigation by-law,[4] to meet such eventual developments; the proposed Detroit new regulations have also included these necessary provisions.

MONTREAL FUMIGATION ORDINANCE

In the Montreal enacted ordinance, "fumigant" is construed to mean, not only "hydrocyanic acid in any form whatsoever," but as well, "any other substance as may be specified by the Director of the Health Department."

Moreover, the use of "fumigants" derived from hydrocyanic acid or its compounds is prohibited in inhabited buildings, unless they are associated with a warning gas, such as cyanogen chloride in the proportion of at least 30 per cent. Warning gases other than cyanogen chloride with their relative proportions to the fumigant used, may, however, be approved by the same authority, provided they give, in "non-dangerous concentrations, a sufficient and non-equivocal warning and render the stay unbearable in the dangerous zone, etc."

DETROIT FUMIGATION ORDINANCE

The Detroit proposed new fumigation ordinance which is being considered by the authorities of the city, contains the following provision in regard to warning gases which has been proposed, after the U. S. Public Health Service has given the assurance that it will cooperate with health departments in the approval of such gases:

> The use of poisonous gases, fumes or vapors in fumigation is hereby prohibited, unless the same are mixed with a warning expulsive gas, or are in themselves warning expulsive gases. Such gas, gases, fumes or vapors or combination thereof, shall be such that the Department of Health of the City of Detroit and the United States Public Health Service approve them as giving sufficient warning to human beings in less than dangerous concentrations, as to create sufficient discomfort to have a definite expulsive effect, etc.

According to H. J. Langhorst, fumigation expert, ideal warning gases are those which have relatively the same specific gravity, vapor density, and penetrating power as HCN. Mr. Langhorst admits at the same time, that such gases are not to be found, but much to be desired.[5]

Warning gases are much heavier than air while HCN is slightly lighter than air; HCN diffuses 1.5 times as rapidly as CNCl, and twice as rapidly as chloropicrin. Warning gases have lower penetrating power and may be aired out before HCN has been completely liberated, and hence it is thought that the post-warning effect is not reliable. It would appear, however, according to Williams [6] that such gases may be of value in preventing accidents in those cases where the fumigant gas has passed through unsuspected openings, from one building to another, and, without doubt, where unwarned persons are entering into premises under fumigation.

We fully realize that the warning gases now being used are not entirely reliable, but we are inclined to believe that the objections to their use are not serious enough to outweigh the advantage of such a practice provided, however, that all the known precautions are taken as well.

As to the relative value of warning gases in commercial fumigation, it is only necessary to consider the case of CNCl and of chloropicrin, as all the other warning gases have not proved so reliable, because of their too great difference in molecular weights as compared with HCN.

The molecular weight of chloropicrin compared to HCN is so different that it cannot constitute a satisfactory warning gas; its characteristics are such that complete separation of the gases may follow as soon as liberated. Moreover, the tear effect remains after the room or compartment has been cleared of HCN and prolongs the clearing out of fumigated rooms when mixtures of above 5 per cent chloropicrin are being used. Nevertheless, the above disadvantage may not outweigh in industrial or ship fumigation the practical advantage gained with the use of simple means or improved methods.

CHLOROPICRIN

Due to their commercial availability other forms of HCN, Zyklon B, HCN Discoids, Cyanogas (calcium cyanide), and liquid HCN, with 5 per cent chloropicrin, have replaced to a certain extent cumbersome generative methods in ship fumigation.

It is to be noted that the problem of house fumigation differs widely as to hazards involved, compared with ship fumigation performed under the supervision of medical officers and a specially trained personnel which has undergone a course of instruction, followed by practical and theoretical tests on the use of lethal gases. Moreover, the danger zone in ship fumigation, is limited to its enclosed space, and the strict ship discipline contributes largely also to the elimination of fumigation hazards.

HCN-CNCL MIXTURE

Although the above methods and fumigants may also be convenient in household fumigation, they do not offer sufficient guarantee for safety and health, as the tear or lachrimating elements contained in these products do not give positive warning.

The cyanogen-chloride mixture, on the other hand, has been found to give positive warning, even in sub-lethal concentrations, and possesses in addition nearly all the characteristics of HCN as a fumigant. The above mixture is not only an insecticide but a germicide as well.

As far back as 1923, an amendment (No. 6) to the U. S. Quarantine Regulations, Public Health Service, was authorized, and since then the cyanogen chloride mixture was added to the list of permitted gaseous agents.

Suffice to cite here part of paragraph 179A, contained in the amendment:

> Cyanogen chloride mixture when used in concentrations, for the length of exposure recommended in these regulations, and by experienced fumigators who avail themselves of the safeguards furnished, is not believed to be attended with any greater hazard than the use of sulphur dioxide.

As to the separation of the constituents of the HCN-CNCl mixture, under ordinary conditions of use, we may quote the following authorities:

Pease: The gas generated at any one time is a mixture of the two gases in the same sense that air is a mixture of (essentially) two gases, oxygen and nitrogen, and that there would be no possibility of any separation taking place under ordinary conditions of use.[7]

Stead: HCN and CNCl may be generated on the premises by adding sodium cyanide and sodium chlorate to HCL in the proper proportion.—The final product is ⅓ HCN and ⅔ CNCl by weight, presumably tied together with a chemical bond.[8]

Frazer: If HCN and CNCl are left for a sufficiently long time to reach equilibrium by diffusion, it will be impossible for them to separate or change concentrations, except as they may diffuse from the hold and escape, and here again the same factors will govern, the lighter gas diffuses more rapidly than the heavier.[9]

Finally as to the relative value of the two warning gases in most common use, CNCl and chloropicrin, it may be of interest to quote here the following extract from a report, prepared by Williams, Hosendorf, and Redlon of the U. S. Public Health Service, on the Fumigation of Vessels:

> Both of the warning gases which have been used with liquid cyanide produce a tear effect. The effect of the 20 per cent cyanogen-chloride gas is greater than that of 5 per cent chloropicrin, *i.e.*, lachrimation is much more marked; and it is believed that, on account of the tear effect, a person unfamiliar with fumigation could escape from a small room containing hydrocyanic-acid gas with 20 per cent cyanogen chloride before inhaling a dangerous amount of cyanide.
>
> The lachrimation which is produced by 5 per cent chloropicrin is much less, and even when used by experienced fumigators it would seem desirable to have a more pronounced warning effect, etc.[10]

In an endeavor to complete our information with the aid of the available data on the subject of fumigation, and on warning gases, in particular, we have obtained various other personal opinions from officers and former officers of the U. S. Public Health Service of which we will take the liberty of summarizing a few:

1. *Cumming:* It is the consensus of opinion of the officials of the United States Public Health Service who have given consideration to this matter, that a warning property in a fumigant is of distinct advantage in the prevention of accidents. It is realized that the gas added to hydrocyanic acid at the present time to give the resulting fumigant a warning property, does not have all the characteristics needed; however, until a satisfactory agent is developed it should be used.[11]

2. *Cumming:* It is the consensus of opinion of officers of the Public Health Service that the use of straight hydrocyanic acid gas for fumigation of buildings or other enclosures should be prohibited. . . . In answer to your question as to the warning agent referred to in my previous letter, this gas was chloropicrin: however, this will apply similarly to cyanogen chloride. Patents on

the use of this latter have been assigned to the Treasury Department and held by the Public Health Service.[12]

3. *Cumming:* It is to be observed that all of the warning gases at present in common use (cyanogen chloride, chloropicrin) are approximately twice as heavy as hydrocyanic acid and under some conditions separate from a mixture of the two gases. Usually this occurs where the gas mixture penetrates further and more rapidly than the warning component. . . . The question of requiring the mandatory use of a warning gas in connection with the application for fumigation purposes of a lethal gas is quite involved and cannot be met simply.[13]

4. *Creel:* Judging from my experience of the last 20 years, I should say by all means, that any laws or regulations governing commercial fumigation of buildings in any city, should provide for automatic safeguards, such as a lachrimating element in all fumigating gas.

HCN-CNCl mixture was first used at San Francisco Quarantine the fall of 1922, and for the 4 years I was at the station fumigating an average of 600 vessels a year, there were no accidents whatsoever, nor so far as I know have accidents ever occurred aboard ships where CNCl was employed.[14]

5. *White:* Regarding my personal opinion as to the fumigants, I may state that I consider cyanogen chloride mixture, containing at least 35 per cent warning gas, as the only safe and fool-proof gas in use today. I have never learned of any accident from the use of it on ships.[15]

6. *Houghton:* Judging from our experience of the past 5 years, we have retailed 50,000 units of our Safri-Fume (HCl-CNCl mixture), without one case of an accident being recorded.[16]

In accordance with the carefully considered policy of the Health Department of the City of Boston where the above fumigants have been mainly used, no attempt to regulate fumigating has ever been made.

STUDY OF AVAILABLE DATA PREVIOUS TO THE PREPARATION OF FUMIGATING ORDINANCES

Following a careful study of all available data, the Montreal fumigation regulations have been drafted, above all, in the interest of safety and public health, regardless of the commercial availability or serviceability of marketed products.

In a general way, the regulations are written in the by-law, but discretionary power is given, in certain cases, to the Director of the Health Department.

The Montreal ordinance dealing with the question of lethal gases, being the most recent piece of legislation on this subject, covers every possible contingency. It includes 41 articles, grouped in 5 chapters, referring to definitions or interpretation of the terms used, certificate of competency, permits and licenses, materials and mode of proceeding; enforcement, and finally, to penalties for contravening any of its provisions.

Among the interpretative clauses which are of interest to cite here are those relating to "fumigant," "nuisance," "danger zone," and "vermin."

"*Fumigant*" is construed to mean hydrocyanic acid in any form whatsoever, or any other substance as may be specified by the Director of the Health Department generated in a building or supplied ready prepared as a liquid, or in a solid form, and which, by itself or in combination with other substances, emits or liberates a gas or gases, fumes, or vapors liable to cause a nuisance.

"*Nuisance*" means any act or omission which may endanger the life, safety, health, property, or comfort of the public of an individual or individuals, or by which the public or any individuals are obstructed in the exercise or enjoyment of any right common to all His Majesty's subjects.

The meaning of the word "fumigant" being well established and its use permitted only on the explicit condition that it will not cause a nuisance as defined above, the boundaries of the "danger zone" had to be extended not only to the rooms within the walls of building, from cellar or basement to the roof level, but in addition, the adjoining ground and any contiguous room in adjoining building, or to any building, the occupants of which are so exposed as to be subjected to a nuisance from fumigation.

Fumigation having for its object the destruction or control of "vermin," this term has been defined as "any insect and other animal pest found in or about a building, which attacks human beings, or domestic animals, or foodstuffs, or organic refuse, or clothing, or bedding, or furniture, etc., namely: flies, bedbugs, fleas, lice, rats, mice, cock-roaches, ants, moths, worms, mosquitoes, spiders, crickets, bats, wasps, ticks, etc."

One of the most important phases of any fumigation ordinance, is that which refers to effective provisions for the qualification and responsibility of persons carrying on fumigation operations.

An examination is required to obtain a certificate of competency from a Board of Examiners, specially named to that effect, which consists of the necessary tests to ascertain the training, experience, and fitness of applicants for licenses, as well as their acquaintance with the provisions of the regulations in force, their knowledge of the methods of resuscitation, the toxic action of fumigants, etc., and finally, a medical certificate from every operator, showing that he is in good health.

Three types of licenses have been provided in the Montreal by-law which entitle the respective holders thereof to perform certain operations:

1. *Master-fumigator:* If duly qualified as fumigator, or having in his employ at least one operator qualified as such, to keep or operate a bona fide fumigation business.
2. *Fumigator:* To conduct fumigation operations for a master-fumigator.
3. *Journeyman-fumigator:* To work under the immediate supervision of a licensed fumigator.

The above licenses are granted by the Director of Finance only when a permit or a written authorization is obtained from the Health Department. A certificate of competency, as referred to above, is required to obtain a license. If issued to a master-fumigator, a real estate bond, or indemnity bond, or public liability insurance policy, in the sum of not less than $10,000, must be furnished to the city by the applicant for the benefit of any one who may suffer injury, etc.

Licenses may be refused or revoked. In case the licensee be convicted for a third time before the Recorder's Court, of any infraction of any provisions of the fumigation ordinance or, for the first time before a higher Court of criminal neglect, his license is *ipso facto* revoked and cannot be renewed.

It is explicitly stated in the by-law and fumigators are required to take notice, that licenses issued, etc., do not bind the city, or place upon it any liability in regard to the processes used or their application, and that the licensees alone must assume the entire liability, criminal or civil, to which they may be subject by reason of general laws, in case of death, personal injury, illness, or property damage by fire or otherwise.

The owners or occupants of commercial or industrial establishments, using fumigants on their own premises, or in connection with the material contained therein, are exempted from obtaining a license, but are required to obtain a certificate of competency; the employees of the Federal and Provincial Governments and of the city, in the performance of their regular duties, do not fall under the jurisdiction of the present regulations. Ship fumigation is controlled by the Quarantine Service of the Department of Pensions and National Health, and are, hence, outside the jurisdiction of the present regulations.

MATERIALS AND MODE OR PROCEEDING

Before fumigating any building in Montreal, the master-fumigator is required to give notice to the Health, Police, and Fire Departments, in the form of a written statement to the effect that he has obtained the authorization in writing of the proprietor and

of all responsible occupants of the buildings to be fumigated, and that he has warned all other responsible occupants of the premises situated within the dangerous zone, of the nature of the operations to be performed on the day and at the time designated.

No provisions have been made for the delivery of a permit to a master-fumigator, to perform fumigation in a specified building, and at a specified time, as no such permission can be given, unless the premises concerned are previously thoroughly inspected by city inspectors —this is left entirely to the licensees. Otherwise, a share of the responsibility in case of accidents or fatalities could be attributed to the enforcing authorities.

As stated above, the fumigators must assume the entire liability in regard to the processes used and the operations carried on, the notification procedure being required only to enable the city to ascertain whether the operators are offending against any of the enacted provisions.

The conditions under which the fumigation operations should be carried on need not be stressed, as they are similar in all ordinances and conform to established practice—sealing of rooms to confine the gas to the fumigated premises; warning signs; guards stationed around the building; removal of food; extinguishing of fires; opening of rooms after fumigation; beating or shaking of articles of bedding, ventilation before re-occupancy, and other operations usual in the practice of fumigation.

The operator should allow a sufficient period of time for ventilation purposes before re-occupancy; such period should not be less, however, than 3 hours, during which time, the temperature of the fumigated premises should be sufficiently high to assure the complete dispersion of gases; in cold weather, the fumigated premises should be thoroughly heated as part of the ventilation operation.

Hence, to prevent stratification of gases in the northern climate, when fumigations are performed on cold days, the temperature of the fumigated rooms should not be below certain limits; this precaution is considered essential, as is also the necessary increase in the period of ventilation on muggy and humid days in the other seasons of the year.

The period of ventilation stipulated above, has been fixed after a careful study and consideration of valuable information on this subject, especially from publications of the U. S. Public Health Service and the U. S. Department of Agriculture reports, etc.[17]

As a matter of precaution no fumigation should be performed unless atmospheric conditions are favorable.

No attempt has been made to regulate the class of materials to be employed in commercial or industrial establishments using special fumigation chambers or vaults nor solely in their own premises nor with reference to the material contained therein. The sale of fumigants to persons other than licensed fumigators, is, however, regulated. Moreover, a report of analysis, signed by a recognized chemist, of the substances used for fumigation is required; at any time, when deemed advisable, the Health Department may cause these substances to be analyzed at the expense of the master-fumigator.

The use of fumigants in inhabited buildings has been the main object of the enacted regulations. Although hydrocyanic acid in any form is the substance intended to be regulated, other substances as well emitting or liberating dangerous gas or gases, fumes or vapors, may be considered as a fumigant and in this connection the Director of the Health Department has discretionary power.

CONCLUSIONS

The above considerations represent our well considered opinion, as sani-

tarians, reached after a careful study of the available data and expert opinions on fumigation. We admit that the greatest danger in household fumigation operations lies in the non-regulation of these activities, but we recognize, as well, that HCN and its compounds are poisonous and can cause death in a very short time, if breathed in concentrations used in fumigation work. A certain number of deaths have been recorded in the last few years when straight HCN has been used. To guard the public against carelessness and even apathy, reasonable safety measures must be provided, such as warning elements, whenever HCN is used. Cyanogen chloride has been found to give non-equivocal warning of the presence of HCN, by rendering the stay unbearable in or about fumigated premises.

Moreover, no known serious accident can be attributed to the use of HCN-CNCl mixture, notwithstanding the scientifically sound, but disputed arguments, as to the separation of its chemical constituents, under certain conditions of use.

Industrial and ship fumigation, as well as fumigations in well constructed and operated vaults or chambers, do not introduce the same hazards, and for this reason important concessions can be made to the choice of materials and the application of methods recommended for such purposes.

A great deal of effort and time have been spent by sanitary officials of different cities and by the manufacturing chemists to devise means that will safeguard human life, but no consensus of opinion has yet been reached. The supreme arbiter in all matters related to public health and sanitation in America is, without doubt, the United States Public Health Service, and, it is a great satisfaction to know that this service is taking an active interest in this question.

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DISCUSSION

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IN 1930, Dr. W. Deckert, of Hamburg, published an extensive paper on the legislative principles of the control of noxious animals by hydrocyanic acid as applied in most of the civilized countries. In this paper, Dr. Deckert endeavored to summarize fumigation control legislation as it then existed, and he cited a considerable list of laws, ordinances, edicts, proscriptions, letters of instruction, and other pronouncements. All through his paper he comments upon the confused picture presented by the continual and active change in fugimation regulations. So impressed was he by this active change that he found it necessary to tabulate control measures as they existed on a certain day, for this purpose selecting September 1, 1929.

The confusion of the picture can best be illustrated in his own words; for instance, where he says: "It appears strange when, as is sometimes the case, one country prescribes exactly what another forbids." As illustrations of this remark he cites that, in Denmark, fumigation of ships below decks is forbidden on account of difficulties in ventilation, whereas, in Spain, below decks may be fumigated and released after only 1 hour's ventilation, but rooms above decks must be ventilated for 8 hours. And again, in one American city, it is permissible to empty residue from fumigating crocks into the sewers, whereas, in Norway, it is prescribed that residues must be made innocuous chemically, and even then must not be poured into sewers but must be buried. Further, in Belgium, injections of camphor are prescribed as antidotes for HCN poisoning in cases of fumigation accidents, whereas, in England, the use of camphor is expressly forbidden.

So amazing and remarkable are the confusion and contradiction of directions concerning fumigation which appear throughout the paper that one with a sense of humor cannot read it without a constant smile, if not, indeed, without breaking into laughter, until, perhaps, he suddenly realizes that these variegated attempts to control as practised by the different countries of the world

are more or less exactly repeated by the equally variegated attempts put forth in the various states and in communities within the states in his own country.

It doubtless appears strange to start a discussion of one paper by discussing another, and that one of several years' standing. But, as a matter of fact, it is quite apropos. One of these papers sets forth the general confusion as concerns fumigation control; the other one, that I am specifically to discuss, sets forth some of the points on which divergence and confusion have arisen. Both of them point the way to the present need, which is a well thought out, well constructed, effective, uniform law that may be adopted, certainly in its essential provisions, in all communities. The time to construct such a model law or ordinance is now, before the innumerable communities of this continent have each, severally and separately, adopted their own more or less, frequently less, effective control measures.

The paper of Mr. Cousineau and Mr. Legg deserves particular notice because it is the first paper in this country, so far as I know, to take up definitely, in a careful and well considered manner, the subject of municipal control of commercial fumigation. The paper is an excellent one and goes so thoroughly into the difficulties in the way of setting up adequate control of fumigation that these are brought clearly to view and naturally present themselves to further discussion. They present some of the points at controversy which must be settled in order to build up a model law that may be confidently adopted throughout the country.

First, there is the matter of cost. As these writers have stated, the question is one of cost as balanced against safety. What this means in setting up control legislation no experienced health officer need be told. To the fumigator higher costs mean less business and smaller profits; he will fight to protect his personal interest. Further, the fact that the business of fumigation, though relatively new, has already assumed considerable proportions and is rapidly growing, will tend to increase the opposition to control involving higher costs. That control does involve higher costs not only of material, but of the trained labor to whom the handling of fumigants must be restricted, is obvious.

The point made by the writers that fumigation is bound up with extermination is an interesting example of the economic association of separate (though allied) trades. At present, the great majority of commercial fumigators are also exterminators, and they are today bending considerable effort to insure that any control legislation shall include both fumigation and extermination.

Next we come to a different type of divergence of opinion—that is, the question of warning gas. Whereas the divergence of opinion concerning costs rests between administrative officials on one side, and the fumigators, and to some extent the public, on the other, the use of warning gas presents a divergence of opinion among fumigation experts and, to some extent, administrative officials themselves. Fumigators also object to warning gases, first, on the ground of increased cost, and, second, on the ground of inconvenience, the use of warning gases constituting a considerable nuisance in the handling of fumigants. To go into a discussion of warning gases here would be time consuming and would hardly serve a good purpose. As one thoroughly familiar with the subject, however, it is my opinion that the controversy over them will not be settled until a new gas is developed that reasonably approaches hydrocyanic acid in efficiency and is in itself a warning gas. A great deal of the present difficulty over warning gases is

that they are gases added to the fumigant.

A third major point of controversy that lies in the way of uniform fumigation control legislation is the proposal to require fumigators to establish their financial ability to cover damages, in the form, usually suggested, of a liability insurance policy or a liability bond. The point at issue here is that only firms of unusually good standing can secure such insurance policies or bonds. This, of course, is the principal aim. Practically, it is an excellent method of securing competency among fumigators, but it may be open to question whether it is altogether proper to enlist, for fumigation control purposes, the services of insurance and bonding companies. The interesting point in regard to this feature is that on the surface it appears that it would be far more effective than other means in immediately improving the type of personnel engaged in fumigations. Insurance companies would probably be much more careful as to whom they granted insurance policies than would be political bodies in issuing fumigation permits.

As to the present need for fumigation control, it is not immediately urgent. Deaths from this cause are probably between 10 and 20 a year in the United States, this of course constituting a trifling figure compared to almost any other cause of death. Fumigation, however, is steadily increasing and this figure may be expected to become greater rather than to be reduced in the immediate future. Furthermore, deaths from fumigation are spectacular and are generally widely published. Nearly all of them, as has been pointed out in this paper, are due in the last analysis to some one's carelessness or negligence.

The great majority of accidents during fumigation of inhabited buildings come under four headings:

1. Accidents to fumigators—These are due to pure downright carelessness or ignorance and can generally be traced, in the final analysis, to improper training of the fumigator or lack of discipline by the man in control.

2. Retention of gas in bedding and other upholstered furniture, with its subsequent release after the compartment has been closed. This is the most prolific cause of deaths in the fumigation of homes, and again, in the last analysis, may be ascribed to carelessness or ignorance. At present writing, I am inclined to believe they may be due more to ignorance than carelessness, as I am convinced that the majority of the fumigators are not really aware of the considerable amounts of hydrocyanic acid gas that are absorbed by bedding, nor of the demonstrated fact that it is released relatively slowly, particularly at low temperatures. Incidentally, this is the type of accident in which present-day warning gases generally fail.

3. Entrance into building under fumigation—This type of accident is due either to failure to place guards, or to failure of guards to perform their duties. Punishment of those responsible for this type of accident should be severe.

4. Passage of gas from one building to another through unsuspected openings—This type sometimes approaches nearest to a genuine accident, as the connections may be most obscure. When the gas passes through plumbing conduits, however, only the fumigator is to blame.

In closing, I feel that I should state my belief as to the form in which a fumigation control law should be drafted. The opening statements of this discussion stressed the state of confusion and rapid change in fumigation control. Obviously, to meet such a situation requires a reasonable variable and flexible law, so that I plead for one in which the essential authority and the policy foundations are set forth in the act, but in which, also, provision is made for details of control to be covered by regulations which may be amended (within the act) by the administrative authority.

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DISCUSSION (*Cont.*)

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Vice-President, Pacific R. & H. Chemical Corp., El Monte, Calif.

ON November 16, 1930, a well known furniture store in uptown New York City was fumigated by the cyanogen chloride method as advocated in the paper which has just been read. Next door, separated from the furniture establishment by a partition wall was a restaurant. Before the fumigation was completed, 15 people in the restaurant were overcome and 5 of them required hospital treatment.

On the morning of December 12, 1932, a steamship in the harbor of Seattle, Wash., was fumigated by this same method. In the early afternoon the ship was opened and ventilated and passed as clear about 4 o'clock. A member of the crew who came aboard and went to bed about 7 o'clock that evening, was found dead in his berth the next morning.

On the evening of December 31, last, a fishing schooner tied up in the harbor of Gloucester, Mass., was fumigated by this same method. During the evening of the same day a sailor came aboard, opened the companionway and entered the crew's quarters. His dead body was found there the next morning when the boat was opened and ventilated.

In view of these three accidents, the statement of the authors that "no known serious accident can be attributed to the use of HCN-CNCl mixture" must be regarded as incorrect.

While I am impressed by the persuasiveness of the arguments which have been so ably presented by them, I find that they all rest upon this assumption, namely, that if a tear gas is added to a fumigant, the resulting mixture will retain its warning properties through the fumigation period and until ventilation is complete. It seems to me that the fallacy of that assumption is clearly demonstrated by the three cases which I have cited, the circumstances of which can be easily verified by anyone who chooses.

It has been remarked by Dr. Edward Bocker, a distinguished expert of the Department of Health of New York City, that "unless a warning gas is wholly satisfactory, it is not satisfactory at all"; if a particular warning agent cannot be relied upon every time, it should not be relied upon at all. "Like the safety belt of the window washer, unless it is reliable every time, he is better off without it, otherwise a false sense of security is created which will ultimately result in disaster." Similar views have also been expressed by Dr. J. T. Oberweger, Superintendent of the Division of Sanitation of the New York Board of Health.

As you know, it is necessary for all fumigation operators to be provided with effective gas masks and to wear them constantly whenever they enter a space under fumigation. Whenever the circumstances are such that an operator is compelled to wear his gas mask, his life may depend, and usually does depend, upon the effectiveness of his gas mask, and that of the operator who should go with him. If, as the authors of this paper recommend, a powerful tear gas is added to the fumigant, the gas mask is thereby called upon to perform an additional, and in some respects, more difficult task, for if the tear gas gets to the man's eyes, either through the canister or through a pin hole in the rubber face piece, the man will be blinded and cannot possibly find his way out alive unless someone leads or drags him out. Accidents have been reported—some of them fatal—the circumstances of which fit this explanation.

If I may be permitted to interpose at

this point a few personal remarks to indicate the reason for our interest in the subject matter of this paper, I would like to say that the concern with which Mr. Ressler and I are connected manufactures and sells a considerable number of materials other than cyanide for use in pest control by fumigation and otherwise. All pest control fumigants, properly so called, are toxic to human beings as well as insects. Some are less toxic than others but *when used in a concentration great enough to be effective in insect control, all of them are potentially dangerous to human life.* Everyone, therefore, who deals with the field of domestic fumigation must consider with great care the matter of public safety. We, as manufacturers, regard that obligation as one of profound importance as compared with which any profit which may be gained from the sale of fumigant materials is a matter of distinctly minor importance. We hold no brief against cyanogen chloride as such. On the contrary, those who make and sell it are our customers. They buy our materials, and, while the entire quantity of cyanide which we sell for domestic fumigation is but an infinitesimal part of our total sales, the general adoption of cyanogen chloride would tend to increase rather than decrease our sales volume.

I desire thus to make clear to you the point of view from which we approach the subject matter of this paper because it might be inferred by some that the reason why we disagree with the authors is because we fear that their suggestions if generally adopted would be prejudicial to our financial interest. Nothing could be more incorrect. We disagree because, after very careful study, we are convinced that the plan which the authors recommend is dangerous to human life.

The idea of using tear gases in connection with fumigation is not new. Beginning about 15 years ago, the U. S. Public Health Service sought suitable tear gases for use in conjunction with hydrocyanic acid. These investigations resulted in the adoption of cyanogen chloride, and attention was called to this fact in amendment No. 6 to the quarantine regulations issued by the Service in 1923. Shortly after, the Service discontinued the use of cyanogen chloride in favor of chloropicrin. More than 5 years subsequent to the abandonment by the Service of the cyanogen chloride method, an eastern corporation which had undertaken the commercial exploitation of cyanogen chloride fumigation gave wide publicity to the subject matter of the 1923 bulletin in such a manner as to make it appear that the U. S. Public Health Service favors the cyanogen chloride method above all others.

In 1930 and 1931 the Bureau of Mines, in coöperation with the U. S. Public Health Service, conducted an investigation which had for its object the finding of a warning agent which could be incorporated into artificial or natural gas sold for domestic use with the expectation that if a warning agent could be found appropriate for this purpose, its use would cut down the number of deaths which are due to accidental asphyxiation. It is reported that in this investigation hundreds of compounds were exhaustively studied at a cost of more than $20,000 without finding any which were deemed satisfactory.

It is a matter of common knowledge that deaths due to illuminating gas are far more frequent than those caused by fumigations. This fact has been recently confirmed by an investigation of Major C. L. Williams, Senior Surgeon of the Public Health Service. The results of his investigation, which were published a few weeks ago, show that during the 6 months period covered by his study, the number of deaths in the United States caused by fumigation were less than one-quarter of those

caused by illuminating gas and less than 2 per cent of those resulting from the inhalation of all other poisonous gases. Deaths from illuminating gas, therefore, represent a far more important problem of public safety than the hazards arising out of fumigation. Notwithstanding this, the warning gas idea has not yet impressed government officials and others familiar with the facts to the point where warning gases have been adopted in the gas industry. In that industry, the relevant facts have been studied with great care in the investigation to which I have referred (*Bureau of Mines monograph No. 4*, entitled "Warning Agents for Fuel Gases").

It seems appropriate therefore to suggest that before sponsoring the enactment of mandatory legislation which would require the use of a particular warning agent in fumigation, health officers would be wise to insist upon a really careful factual case study of all known fumigation accidents to determine in each instance the cause and what individual or individuals were responsible.

It is, nevertheless, no secret what must be done in order to deal successfully with the hazards of fumigation. There are only two basic requirements. First, the practice of fumigation must be confined, by means of a suitable permit system, to individuals who possess the proper qualifications of training, experience and character; and second, those individuals must be held accountable for the performance of fumigations in accordance with safe practices that are already well recognized. The successful enforcement of such requirements no doubt brings to the health enforcement officer some administrative problems. How serious these problems are I do not know, but however troublesome they may be, it is clear that the vast majority of our cities are handling them successfully today.

In the paper which has just been read, it is stated that "in accordance with the carefully considered policy of the Health Department of the City of Boston where the above fumigants (cyanogen chloride) have been mainly used, no attempt to regulate fumigation has ever been made." It is not clear to me just what the authors wish to be understood by that statement unless they wish to be understood that wherever cyanogen chloride is used as a warning agent, one may safely relax some of the precautions which would otherwise be necessary. Similar claims have in the past been made by individuals interested in the commercial exploitation of this method of fumigation. Any such suggestion is not warranted by the past record of fumigation in which cyanogen chloride has been used. In the handling of dangerous materials I am prepared to state emphatically that there is no substitute for training, experience, care, and vigilance. I make this assertion on the strength of 15 years' experience during which several thousand tons of hydrocyanic acid has been manufactured and shipped under my personal supervision without a single fatality.

Before I conclude my remarks I should like to quote from two paragraphs of the article by Major Williams to which I have already referred:

> During the 6 month survey, the number of deaths reported in the press clippings reviewed which occurred from fumigant gases in the United States totaled 6, while deaths resulting from the inhalation of other poisonous gases numbered for the same period 382.
>
> According to information obtained from available sources, it is estimated that the number of building, railway, and ship fumigations performed in the United States during 1933 was approximately 74,000. Of this number about 60,000 were fumigations of domestic dwellings, 5,000 industrial fumigations, 7,000 railway cars, and 2,000 ships. In addition to these, there are performed yearly a large number of horticultural fumigations, for which it is difficult to arrive at a definite estimate owing to the fact that these fumigations are figured in "acres of glass." There are about

15,000 greenhouse companies in the United States, many of which own long ranges of greenhouses. Greenhouses fumigate at least once every month during the growing season, and mushroom houses several times during the year. The year 1933 having been a subnormal year, the estimates cited above may be considered conservative. From these figures it would appear that the deaths average about 1 to every 6,000 fumigations. . . .

Notwithstanding the relatively small number of fatalities at present occurring from this cause, nevertheless in view of the trend toward increased use of lethal gases for domestic purposes, the adoption of reasonable legislation for the control of the practice is believed advisable; but at present it is apparently not a matter of justifying emergency or ill-considered enactments.

In conclusion and in view of the known record, I want to say with all the earnestness at my command, that any body which enacts legislation relying on this so-called warning agent for the protection of human life or any public officer who sponsors such legislation, takes upon himself a fearful responsibility.

REPLY TO MR. PRATT'S DISCUSSION

AIMÉ COUSINEAU AND F. G. LEGG

THE discussion of our joint paper by F. S. Pratt, Vice-President of the Pacific R. & H. Chemical Corporation, El Monte, Calif., was not officially listed on the program. In some respects its presentation was a surprise to the authors; on the other hand, we have known for a number of years that the cyanide manufacturers have been opposed to the use of warning gases unless the "perfect warning agent" which will prove effective under any and all conditions, is perfected. We naturally respect their opinions and, although we cannot agree with their conclusions, we welcome Mr. Pratt's discussion and urge its inclusion as a contribution to a subject that is of vital concern to those interested in public safety. The object of any paper is to invite discussion. The more voluminous the comments, either pro or con, the more valuable in proportion will be the contribution to the subject at hand.

Any person or persons sponsoring the enactment of legislation reasonably calculated to afford greater protection to the public, if he or they be sincere, need not be unduly perturbed by the conclusion presented by Mr. Pratt "that any body which enacts legislation relying upon this so-called warning agent for the protection of human life, or any public officer who sponsors such legislations, takes upon himself a fearful responsibility."

In the last analysis, the public expects, and justly so, that some public minded person or persons will be solicitous for their welfare and will do everything within reason to protect their interests. Mistakes may be made, but efforts in the anticipation of increased safety are justifiable, and any attempt to minimize in any way an existing hazard that cannot be denied appears reasonable.

The authors have not admitted that warning gases, as now used or recommended, are perfect. Our statement in this respect is clear in that we believe that the objections to their use are not serious enough to outweigh the advantages of their use, provided that all known precautions are taken as well.

The citation, of the three accidents, by Mr. Pratt as having occurred where warning agents were employed is not, in our judgment, a sufficient ground for a blanket condemnation of the use of warning agents.

The New York accident mentioned by

Mr. Pratt did not result in any fatality. Had other known precautions been observed, as are recommended by the authors, even with the use of warning agents, the accident might possibly have been prevented. New York does not require warning gases to be employed in fumigation, and because it is alleged that a warning gas was used in this particular instance, and that it did not prove to be 100 per cent effective, is no conclusive proof that warning gases have no value in fumigation. There is the possibility that the warning agent in the instance cited may have had some value in preventing more disastrous results.

At the time our paper was prepared the authors were not in possession of the facts relating to the two cases cited in which the use of warning gases resulted in fatalities in Seattle and Gloucester. We have not, as yet, been able to obtain the official reports of these accidents.

The one in Seattle, we understand, was on shipboard and probably outside of the jurisdiction of the Seattle Health Department as we have reason to believe that the Seattle Health Department did not have complete details at that time. The one in Gloucester was also on shipboard and possibly outside of the jurisdiction of the local health department.

According to our information this last fumigation had been made without the services of a fumigating company, and the most elementary precautions, such as the services of a watchman, who, no doubt, would have prevented the victim from going down the forecastle of the ship to reach his bunk, after a tiresome day or leave of absence.

It is not our purpose to deny the occurrence of the three instances cited by Mr. Pratt. It is, however, our purpose to assert that if other known precautions had been employed in connection with these fumigations, the mere fact that a warning agent was employed is not in our judgment sufficient proof of the undesirability of warning agents in fumigating practices.

The statement by Mr. Pratt which has reference to the number of deaths caused by illuminating gases as being 4 times those caused by gases used for fumigating and exterminating should be carefully analyzed before any conclusions should be drawn from the statement. It is probably true that a relatively large percentage of all homes in urban communities are provided with illuminating gas services for cooking and for water heaters. Those who have experience in the control of cyanide gas fumigation would, I am sure, have many sleepless nights if fumigation were to be performed over a period of 6 months in every dwelling in the country in which there is a service for gas.

The Part of the Public Health Nurse in the Epidemiology of Syphilis*

Maternity and Child Health Services

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THE relation of the public health nurse to maternity and child health services has long been considered of importance. The interpretation of the part of the public health nurse in the epidemiology of syphilis presupposes that she is one who:

Is prepared or experienced in general public health activities

Recognizes syphilis as a communicable disease

Knows the facts of diagnosis, treatment and communicability of the disease

Appreciates the pathological, social and economic importance of early diagnosis and treatment

Understands that her approach to the syphilitic patient is comparable to that of any other communicable disease

Is acquainted with community agencies and institutions offering diagnostic and treatment services.

It is also assumed that a community employing public health nurses is cognizant of the social and economic importance of preventive as well as curative services, and that some provision is made for them.

The effectiveness of the public health nurse's work is directly influenced by the services provided within the community which limit or increase her opportunities for usefulness. Her assistance may be given to patients of private physicians or as part of a free or pay clinic service. Her procedure will be in harmony with the program of treatment of the patient by the physician in office or clinic practice, and her first duty is to know that program.

The home visit gives opportunity for interpretations of many procedures that are quite clear and simple to a member of the profession, but vague to the patient and family. There the nurse finds the best opportunity to stress the importance of medical supervision early in pregnancy and teaches the value of each step. Even though the physician may have explained the meaning of a positive Wassermann and need for treatment, there will be lingering fears or questions needing to be cleared away. Encouragement may be necessary for the patient to continue treatments. Changes in the family régime may be required, and with the aid of the experienced worker, a schedule may be evolved whereby the wage earner's time may be less affected and add to the convenience of the patient and other members of the family.

Transportation is an important factor for the prenatal patient who must also attend the anti-luetic clinic. It is comparatively easy for volunteer transportation to be secured for an occasional

* Read at a Joint Session of the American Social Hygiene Association and the Public Health Nursing Section of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 3, 1934.

visit, but to continue these visits at regular intervals over a long period of time adds complications. However, that such a program can be effected was demonstrated by a member of a volunteer motor corps who left her home before 8 o'clock to bring a mother and her 4 small children to the morning antiluetic clinic. The time involved was approximately 3 hours, the distance approximately 15 miles, and the volunteer carried on without omission for the entire series of treatments.

Responsibility for the continuation of the mother's treatment after the postpartum period often rests with the nurse. As in any other long continued treatment, there is a tendency to grow lax, and it again becomes necessary to emphasize the need and make new plans for the care of mother and child over prolonged and repeated periods.

A principle applied to all communicable disease control is that requiring examination of contacts. Certainly no public health nurse will fail to bend every effort to secure adequate examination of contacts of a luetic patient although it may present some difficult, and sometimes delicate, situations.

The triangle relationship of clinic, patient, and public health nurse should not be ignored. Of course, the antiluetic clinic is of prime importance but many of its patients are recruited from other clinics and in proportion to the thoroughness of examinations and system of reporting. The routine of clinic activities offers many opportunities for correlation of programs.

Since syphilis may be passed from mother to child in utero, the prenatal clinic holds a definite place in the control and prevention of syphilis. The patient should be urged to register early in pregnancy and the Wassermann should be part of the routine procedure of the first visit. In one prenatal clinic, all new registrants' names, addresses, and probable dates of maturity are given to the health department for the prenatal teaching program. The clinic registrar reports to field nurses all positive Wassermanns, and the patient is immediately referred to the antiluetic clinic for treatment. Patients registered in this prenatal clinic are confined in the hospital where spinal fluid Wassermanns are a routine procedure.

Routine duties of the obstetrical ward include a report to the health department of patients dismissed with address, age, and condition of infant, condition of mother, and special note of lues or other symptom requiring attention. These reports are referred to the public health nurse in whose district the patient resides, and home visits are resumed.

Upon dismissal from the hospital, each mother is given dates for postpartum visits to the clinic. When the mother is dismissed from post-partum care, the baby is transferred to the well baby clinic for supervision throughout infancy and preschool life. In the well baby clinics, observation for control of luetic infections is continued.

Study of 583 maternity patients from this clinic and hospital service in 1 year resulted in finding 10 mothers with positive luetic reaction. Each patient was given at least 2 tests. Reaction of 1.7 per cent is a very low incidence in a highly cosmopolitan clinic group as compared with reports from other parts of the country. In a children's clinic of another California city, also highly cosmopolitan, records of 3 years show 2 per cent of all children registered had congenital syphilis. Since treatment for congenital syphilis is recommended to begin in infancy, the emphasis of the public health nurse may well be upon the care of the very young child.

However, we are told the prevention of congenital syphilis depends upon treatment of the infected mother from the third month of pregnancy until the

infant is born. Here is a definite challenge to the public health nurse to secure adequate prenatal care for each and every woman whether she be the patient of clinic service or of private physician.

Two types of clinics cover supervision and care in child growth and development—supervisory and treatment. Both offer opportunities for diagnosis. Supervisory clinics may be conducted by health departments conforming to recognized public health principles. Treatment clinics, pay or free, constitute the medical relief service for definitely sick children, some of whom may have symptoms directly traceable to luetic origin. Possibly the supervisory clinics deal with children having more obscure symptoms which may respond to treatment.

Many problems arise in correlation of health and social programs from the clinics offering:

Examinations for school children
Examination of families applying for state aid
Examination of children admitted to children's home
Examination of children referred to institutions for correction of social adjustment

Problems may be a challenge to the policies of organizations serving the people in clinical diagnosis and treatment, material relief, preventive health and educational service. That relief agencies recognize the value of prevention and follow recognition with action is demonstrated by the solution of a problem arising from the examination of a mother applying for state aid. Anti-luetic treatments were needed and the most convenient means of transportation was by interurban railway. The relief agency paid the carfare which amounted to about $.90 round trip, and felt justified in doing so because of the improved health of the mother.

There are many factors and many workers concerned in the process of correlating programs in the evolution of adequate health and welfare facilities, but given the vision, the public health nurse may play an important rôle, for hers is the opportunity to:

Teach individuals and families to protect their own health and safeguard the health of their children.

Encourage and assist in the adjustment of individual, family and social conditions that effect the health program.

Join with other health and social workers in correlating programs for the welfare of the individual and the community.

Respond to the challenge and assist in the control and prevention of syphilis through public health nursing activities connected with maternity and child health services.

Fish and Sea Food Institute of the United States

ESTABLISHMENT of the Fish and Sea Food Institute of the United States, with headquarters at 80 Broadway, New York, N. Y., is announced. It is "sponsored by the fish industry to promote a better understanding of the advantages of fish and sea food, emphasizing its economy, food value, and taste." At an inaugural luncheon on February 5, attended by dietary experts, health officials, home economists, research experts and others whose interests are increasing the per capita consumption of fish, the speakers included: Harden F. Taylor, a director of the Fish and Sea Food Institute of the United States; William Fellowes Morgan, Jr., Commissioner, Department of Markets, Weights and Measures, City of New York; Agnes I. Webster, home economist, U. S. Bureau of Fisheries; and J. George Frederick, president, Society for the Advancement of Better Living.

Some Observations on the Use of Alum Precipitated Diphtheria Toxoid*

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SINCE Glenny and Barr,[1] in 1931, first described a method for the precipitation of diphtheria toxoid with potassium aluminum sulphate and showed its exceptional antigenic efficiency in animals, evidence has been rapidly accumulating that a single dose will change well over 90 per cent of Schick positive children to Schick negative in 8 weeks. Wells, Graham, and Havens,[2] in 1932, confirmed the observations of Glenny and Barr in guinea pigs and gave the single dose injection to 98 children, all with strongly positive Schick reactions. At the end of 8 weeks all but 6 had been rendered Schick negative. Graham, Murphree, and Gill [3] obtained more than 92 per cent negative Schick reactions in 185 Schick positive children, within 2 to 4 months after a single injection. Baker and Gill [4] in 197 Schick positive children (22 of whom were older than 13 years) obtained negative Schick reactions in 100 per cent after a single dose. McGinnis and Stebbins,[5] using 1 dose of precipitated toxoid and working with a representative number of children, all of whom were Schick tested before and after immunization, concluded that—

One dose of alum precipitated toxoid is as effective as 2 doses of toxoid containing 10 units with 0.2 per cent alum added.

They obtained with 2 doses of toxoid containing 0.2 per cent alum and 1 dose of alum precipitated toxoid, 95.4 and 95.9 per cent Schick negatives, respectively, in 295 and 266 children in the age group 5 to 9 years. Thus there does not seem to be any question as to the efficiency of alum precipitated toxoid as an antigen—it is without doubt the most effective agent yet devised for immunization against diphtheria, but it has certain distinct disadvantages which will be mentioned later.

Most workers have indicated that the probable reason for the extraordinary activity of precipitated toxoid lies in the slow rate of absorption of the comparatively insoluble precipitate, the single injection acting as both the primary and secondary stimulus defined by Glenny and Sudmersen.[6] To test this theory, an experiment was planned wherein the nodule which persists at the site of injection was dissected from the tissues of guinea pigs at weekly intervals, and reinjected into guinea pigs in which the serum had previously been titrated at the 1/250 unit level to insure the absence of antitoxin. Nodules were dissected from 2 to 4 pigs each week up to the 7th, ground in a mortar with salt solution, and reinjected into

* Read at a Special Session on Diphtheria Immunization of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 4, 1934.

2 test pigs. These test pigs were bled after 6 weeks, the serum of each pair pooled and tested for antitoxin. Antitoxin was present in the serum of all, those reinjected at the 7th week showing 1/5 unit per c.c. Thus it is apparent that 1 dose in the tissues of the guinea pig exerts its antigenic effect for at least 7 weeks. Since induration following injection in children may be elicited for as long as 6 to 8 weeks, it seems reasonable to assume that the stimulation of antitoxin production continues for this period.

This long continued antigenic action not only serves as a constant stimulant to the mechanism of antitoxin production but also seems to produce in a few persons hypersensitiveness to the protein contained in a subsequent Schick test. McGinnes [7] has reported a number of immediate allergic reactions following the Schick test applied 8 weeks after precipitated toxoid, in at least one of which adrenalin was required. Preliminary Schick test in the same children was not followed by unusual reaction. The writer [8] has described the antigenic action of alum precipitated pollen extract as compared to liquid extract in the guinea pig and has shown that the precipitated extract is a much better sensitizing agent than the same extract before precipitation. It is probable that the explanation for the allergic reactions observed by McGinnes lies in this increased sensitizing action of the precipitated toxoid over the fluid toxoid from which it was prepared. It is of considerable interest that the same immunizing procedure is so highly effective in the production of both antitoxic immunity and protein hypersensitiveness.

In a small number of observations it has been noted that vaccination against smallpox, if done as early as 11 days after injection of precipitated toxoid, may be followed by a localization of the virus around the indurated nodule. This localization is shown by an aerola equal in size and character to that surrounding the vaccine pustule, and fades at the same time. Vaccination 21 days after injection of toxoid in 11 subjects showed normal vaccinia in 9, and in 2 there seemed a slight tendency of the virus to localize at the site of toxoid injection. Further studies on this tendency of localization of vaccine virus should be made, the site of toxoid injection being carefully examined from the 9th to the 12th day after vaccination. Simultaneous immunizations offer an excellent opportunity for study of these reactions.

The immediate local or general reactions following precipitated toxoid are no more noticeable than those following crude toxoid. Most workers believe that they are less so. The very slow rate of absorption as evidenced by the persistence of an indurated nodule at the site of injection should decrease the allergic reaction due to hypersensitiveness to diphtheria protein. Toxins intended for the preparation of precipitated toxoid should be grown for as short a period as is consistent with the production of a strong toxin in order that the concentration of autolytic products may be kept as low as possible. Good toxins may be produced in 7 to 8 days; and longer cultivation, while increasing flocculating value, probably adds materially to the number and severity of reactions in sensitive subjects.

During the past few months an increasing number of reports of the occurrence of sterile abscesses following precipitated toxoid have been received. These develop in from 6 to 10 days after injection, are very slightly painful, sterile, and heal readily after incision. Some may open spontaneously while many indurated areas develop small points of fluctuation which go on to resolution without surgical interference. To date, all products reported as hav-

ing caused abscesses have either been manufactured from toxins grown for longer periods than 8 days or have contained an excess of aluminum, or both factors have been found to be present. Manifestly, the injection into the tissues of a comparatively insoluble precipitate will of itself set up some degree of local irritation, and any additional irritating factor will necessarily add to the probability of abscess formation, hence the necessity for keeping the content of aluminum and of bacillary protein at the lowest possible figures. While approximately 1.5 per cent potassium alum which is present in toxoids precipitated with 2 per cent alum seems to cause a degree of induration which is not particularly objectionable, the preparation of toxoids which require less alum for precipitation, reducing the aluminum to a still lower percentage, will represent a distinct improvement in the product. The possibility of a very slight residual toxicity in crude toxoids from which the precipitates are prepared must also be considered. Such toxicity would necessarily be so slight as to escape detection by the routine 5 c.c. doses in guinea pigs observed for 30 days, but might conceivably be sufficient to produce unpleasant reactions during the extended period that the precipitate is in contact with the tissues. This point is being further investigated.

Children under 6 years give a minimum of local and practically no general reactions to precipitated toxoid, and since a large proportion of this age group is susceptible to diphtheria, they may be immunized without prior Schick test. Older children, however, in addition to furnishing a lower percentage of susceptibles are more prone to show unpleasant reactions and therefore only susceptibles should be injected. Precipitated toxoid is so dependable in its antigenic activity that for practical purposes in mass immunization, a post-Schick test may be omitted, not more than 5 or 6 per cent of children who receive a single dose showing a positive Schick after 8 weeks. The post-Schick test is more difficult to interpret after precipitated toxoid, probably due to increased sensitivity to the protein in the Schick material which is induced by the long continued stimulation during the immunizing process. A heated control is necessary to avoid confusion in doubtful cases.

The enormous advantage of immunization by a single injection needs no comment and the rapidity with which precipitated toxoid is supplanting the older agents is evidence of its popularity with the profession. However, the objection of unpleasant reactions must be kept in mind. There is increasing evidence that these reactions, frequently resulting in abscess formation, are more common than reports indicate, and in order that the product may be steadily improved, field experiences should be reported to central authorities for transmission to the manufacturers.

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Home Canning and Public Health*

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THE art of food preservation by canning in the factory has never been on a sounder basis than it is today. Hundreds of thousands of dollars have been spent to bring the industry to its present position. Spoilage has been greatly reduced and no outbreaks of botulism have been attributed to factory-canned foods packed in America since 1925. This statement becomes still more significant when the relatively small amounts of home-canned foods in contrast to the large amounts of factory-canned foods are considered. The situation for home-canned foods, however, is not so fortunate. Procedures are still recommended to the home-maker which not only give products which may not keep well but which may poison her entire family. Frequent warnings have been given of the danger of inadequate processes. Schoenholz, Esty, and Meyer [1] warned that home-canned foods may be dangerous when they said:

> The prevention of human botulism will, therefore, remain a difficult problem until safe processing procedures are employed in the household for the preservation of certain vegetables.

This opinion has been borne out by large yearly tolls of botulism caused by home-canned foods since then. Fellers [2] made the following statement:

> The canning guides, bulletins, circulars, and recipes distributed by state agencies, magazines, women's clubs, and manufacturers of canning equipment contain many erroneous statements and faulty methods which have been directly responsible for several outbreaks of botulism besides causing great losses through spoilage of good human food. Accurate and safe directions for preserving food products should be prepared by state colleges and similar agencies in order that any present faulty, unsafe methods may be rectified.

A similar warning was issued by the California State Department of Health in 1933.[3] Despite these emphatic statements, little attention seems to have been given to the problem by some of those who are advising home-makers, and botulism outbreaks caused by improperly processed home-canned foods continue.

Any method of food preservation may be evaluated largely from two positions —spoilage and food poisoning. The former has been almost entirely ignored by some of those who disseminate information to the home-canner. Little actual information is available, however, on spoilage, for the average home-maker keeps no records. Neither is she trained to detect all kinds of spoilage, and undoubtedly many home-canned foods which have started to spoil, are prepared for the table because evidences of spoilage are not sufficiently pronounced. Although this phase of the problem need not be stressed unduly before this Association, spoilage is closely related to poisoning. A preserved food in which considerable spoilage has taken place may be potentially dangerous. *Clostridium botulinum*, the agent of poisoning of greatest

* Read at a Joint Session of the Laboratory and Food and Nutrition Sections of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 3, 1934.

interest in this connection, may produce profound changes in the foodstuff. Foods which have undergone such changes would ordinarily be excluded from the diet. However, it is definitely known that toxin may be present without evidences of decomposition.

Few studies seem to have been made on the keeping qualities of foods preserved by methods used by the home-maker. Stienbarger [4] summarized the results of such studies started by the Bureau of Home Economics in 1917. The period elapsing between processing and opening varied from 2 months to 5 years and averaged 1 year. In general, jars which were stored for longer times showed greatest spoilage. Containers which had imperfect closures were excluded from the summary. Bacteriological examinations were, in general, not made. Cursory examination for the usual signs of spoilage (condition of the container, appearance, odor, and sometimes flavor) was the only criterion. Bacteriological examination would probably have shown higher incidence of understerilization. Of 3,434 jars and cans of food, most of which were processed in boiling water, 1,659, or 48 per cent, showed evidences of spoilage. Of 783 jars processed in the steam pressure cooker, 93, or 12 per cent, spoiled. Stienbarger, however, pointed out that since some of these jars had been packed, longer processing times have been found to be desirable and 12 per cent spoilage is probably much larger than would be found today. The foods most frequently spoiled were meats, fish, corn, lima beans, and peas. Meats and fish processed in the water-bath showed heavy spoilage.

The report should be read by all who are directly interested in home-canning and especially by those who still favor boiling water processes for non-acid foods. To show a few of the data reported by Stienbarger, Table I has been prepared. Spoilage, it will be seen, is as high as 71 per cent in one food. In some cases the process times used were shorter than those recommended today, in others they were longer. Comparison of process times used with the foods in Stienbarger's report with those now recommended by some manufacturers of canning equipment indicates that they compare quite well. Sunderlin, Nelson, and Levine [5] also reported the results of comprehensive studies in home-canning. Their work was carried out "with a view to securing spoilage data and time tables for this method of canning vegetables and meats. . . . Process times found entirely satisfactory, under the conditions of the experiments were 2½ hours for beans and chard, 3 hours for beef and pork, and 20 minutes for tomatoes."

Bacteriological tests on the jars consisted of microscopic examination of the sediment, plate count at 37 and 20° C., and growth in fermentation tubes. No attention was given to anaerobic spore-forming, or thermophilic bacteria, the organisms chiefly responsible for spoilage in canned foods. Furthermore, the majority of the jars were not incubated at 37° or 55° C. before examination. In a pack of green beans the temperatures of storage had a decided effect on the keeping qualities. No difference was observed between basement and room temperatures since no spoilage occurred after 2½ and 2 hr. boiling water processes. However, at 37° C., and 55° C., the amount of spoilage was 66 and 100 per cent respectively. They interpreted this to indicate that sterility was not obtained although products were secured which would keep if stored at sufficiently low temperatures. What would the "keeping quality" have been if all of the jars had been stored at 37° and 55° C.? They reached the conclusion that whether better results would be obtained by the use of the pressure cooker than by the boiling

water bath remained to be seen. Adequate methods of examination of the jars might have given a different picture. The possible relation of food poisoning by *Cl. botulinum* to home-canned foods was not studied. They refused, however, to taste of their foods even though the processes were said to have been satisfactory under the conditions of their experiments.

Spoilage might be considered to be of economic importance mainly and botulism of public health significance. *Cl. botulinum,* however, is a spoilage organism and any pack of non-acid home-canned foods in which there is an undue amount of spoilage may be considered to be potentially dangerous because it probably has been understerilized.

TABLE I

SHOWING SPOILAGE RECORD OF HOME-CANNED FOODS PROCESSED IN BOILING WATER

(After Stienbarger, 1933)

	1919			*1920*		
Vegetable	*Number*	*Spoiled*	*% Spoiled*	*Number*	*Spoiled*	*% Spoiled*
Asparagus				127	17	13
Corn	49	35	71	73	66	90
Lima Beans	106	15	14	83	21	25
Peas	62	9	15	61	42	69
Spinach	153	66	43	63	34	54
String Beans	133	52	39	156	79	51

As stated above, not an outbreak of botulism has been caused by foods canned in American factories since 1925. This fortunate situation results from the expenditure of large sums of money to learn more about *Cl. botulinum,* heat penetration into canned foods, and other factors important in canning. The situation for canning in the home is not so satisfactory. Each year sees its toll of human lives which, to a great extent, may be credited to some extension services, editors of cookbooks, and manufacturers of supplies for the home canner. In Table II, the recommendations of a number of such authorities are given. How long such a situation will be allowed to continue remains to be seen. In some states serious outbreaks of poisoning had to occur before any real advance could be made in changing unsound recommendations. The outbreaks of botulism which have occurred in the United States for the years 1929 to 1933 inclusive are shown in Table III.* Examination of Table III should convince one that something is wrong with procedures used by home-canners, for home-canned foods are involved in practically every outbreak during these years. Stronger evidence that home-canning literature needs revision need not be sought. In the *31st Biennial Report* of the Department of Public Health of California it was stated that since 1889, 192 known cases of botulism occurred, 119 of which resulted fatally. Most of them were said to have been caused by home-canned foods. If graduates of schools of home economics and others who consider themselves capable of recommending procedures for the home-maker do not recognize all bacteriological knowledge, they should be forced to do so by those whose duty it is to conserve the public health. It would be unfortunate to have to resort to legal procedures to indicate that those who distribute unsound literature have some responsi-

* This list is not complete; other outbreaks attributed to home-canned foods were reported.

TABLE II

SHOWING RECOMMENDATIONS TO HOME-CANNERS BY VARIOUS AUTHORITIES

Authority	*Date*	*Vegetables*			*Meats*		
		Oven	*Boiling Water*	*Pressure Cooker*	*Oven*	*Boiling Water*	*Pressure Cooker*
Automatic Canning Devices, Inc.	1931			R			R
Peoples Gas Light and Coke Co., Chicago	1933			R			R
Dixie Canner Co., Hot Springs	2nd ed.			R			R
Sears, Roebuck & Co., Chicago	*			R			R
Montgomery Ward & Co., Chicago	*			R			R
Ladies Home Journal, Philadelphia	JE 1072			R			R
The Washington Bureau				R			R
Good Housekeeping	1931			R			R
The Detroit Free Press				R			R
Burpee Can Sealer Co.	1934			R			R
The Delineator				R			
The National School of Pressure Cooking	1934			R			R
The Coleman Lamp and Stove Co., Wichita	A 225			R			R
Ball Bros. Co., Muncie, Indiana	1933	R	R	R	R	R	R
Owens-Illinois Glass Co.			R				
Kerr Glass Mfg. Corp., Sand Springs, Okla.	1934	R	R	R	R	R	R
International Harvester Co.	1927		R	R		R	R
Boston Woven Hose and Rubber Co.	1933	R	R	R		R	R
The Chicago Tribune		R			R		
The Chicago Herald and Examiner		R	R	R			
The Chicago American		R	R	R			
The Detroit Free Press				R			R
Boston Sunday Advertiser	1933	R	R	R	R	R	
The Detroit News	1932	R	R	R	R	R	R
The Philadelphia Public Ledger			R	R			
The American Stove Co.	1930	R			R		
Boston Cooking School Cook Book (Farmer)	1931	R	R	R			
Foods and Home Making (Greer)	1931			R			
Every-Day Foods (Harris and Lacey)	1927		R	R			R
The Settlement Cook-Book (Kander)	1931		R				
Successful Canning and Preserving (Malcolm)	1930		R	R			R
The Butterick Cook-Book (Rose)	1924		R	R		R	R
The Blue Gingham Cook-Book (Wolcott)	1928		R				
The Pictorial Review Cook-Book	1931	R	R	R		R	R

TABLE III

BOTULISM OUTBREAKS FOR THE YEARS 1929–1933

Location	*Product*	*Method of Preparation*	*Cases*	*Deaths*	*Remarks*
Chicago	Shallots	Imported	2	1	Packed in Italy
California	Persimmons				
Yakima	String Beans	Home Canned	2		
The Dalles	Beets	Home Canned	2	1	
Green Bay	Celery	Home Canned	2	2	
Hudson, Wyo.	Beans	Home Canned	6	4	
Salida, Colo.	Sausage and Tomatoes?		4	2	Newspaper Report
California	Pork Loin	Home Pickled	3	2	
		1930 OUTBREAKS			
Trinidad, Colo.	Chili con Carne	Home Canned	3	2	
Sidney, Nebr.	Asparagus	Home Canned	4	2	
Sentinel Butte, N. D.	String Beans	Home Canned	4	4	
Torrance, Calif.	Tuna	Home Canned	5	3	Type B
		1931 OUTBREAKS			
Scotts Bluff, Nebr.	Spinach	Home Canned	2	2	Type B proven
Purrell, Colo.	String Beans	Home Canned	3	2	
Amarillo, Tex.	Spinach	Home Canned	2	2	
Los Angeles, Calif.	Antipasto	Imported	3	1	Packed in Italy
Bishop, Calif.	String Beans	Home Canned		1	Type A
Saugerties, N. Y.	Spinach or Chard	Home Canned	5	2(?)	
Grafton, N. D.	Vegetable Salad	Home Canned	16	13	Type A
Newport, Ore.	Salmon (Smoked)	Home Canned	2	2	
Pueblo, Colo.	Corn	Home Canned	42 Chickens		

(*Table III Cont. p. 306*)

bility to the public. Furthermore, those who interpret scientific data for those who are less informed, must leave nothing unsaid. Improperly processed home-canned foods are hazardous.

Canned food technologists are agreed that non-acid foods must be processed only under steam-pressure. Steam-pressure cookers have been devised for this purpose, but the mere use of such a cooker is not sufficient, for it must be correctly used and the non-technical home-maker must be taught to appreciate the necessity of following instructions which come with the cooker. Some of these instruction books should be more carefully written.

Practically all pressure cookers depend on a pressure gauge alone for controlling temperature. This is probably satisfactory if the gauge is of high quality and all air is removed from the cooker. The pressure gauges furnished with some cookers are probably untrustworthy. However, good canning practice should provide for a reliable thermometer with which the actual temperature may be determined. This is necessary not only because the atmosphere in the cooker may contain considerable air, but because the gauges may become faulty by use year after year without inspection and adjustment. The effect on temperature of various amounts of air in the steam is well shown in Figure I. Stienbarger's

TABLE III
(Continued)

BOTULISM OUTBREAKS FOR THE YEARS 1929–1933

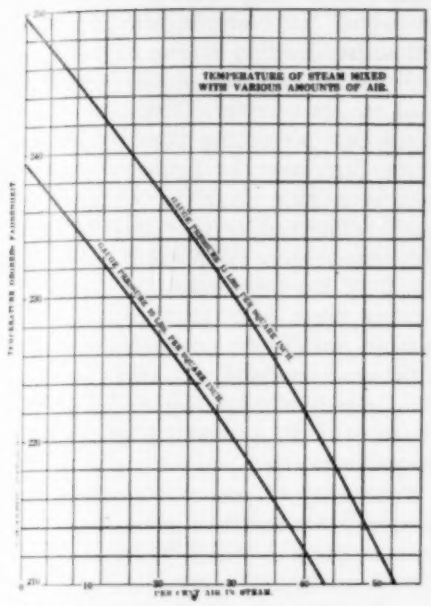
Location	*Product*	*Method of Preparation*	*Cases*	*Deaths*	*Remarks*
1932 OUTBREAKS					
Pueblo, Colo.	Peppers	Home Canned	2	2	
Biola Fresne, Calif.	Corn	Home Canned	1	1	
Bordeaux, Wash.	Corn	Home Canned	1	1	
Phillipsburg, Pa.	String Beans	Home Canned	2	2	
Verdel, Nebr.	Corn	Home Canned	3	3	
Burger, Tex.	Beet Tops	Home Canned	2	2	
Gordon, Mont.	Pork	Home Canned	4	2	
Glenwood Spr., Colo.	Cauliflower	Home Canned	1	1	
Cleveland, Ohio	String Beans	Home Canned	0	0	
Maryville, Tenn.	Vegetable Soup Mixture	Home Canned	7	6	
Modale, Ia.	Corn	Home Canned	24	23	Chickens
Sams Valley, Ore.	Carrots	Home Canned	Horse and Chickens		
1933 OUTBREAKS					
Coeur d'Alene, Ida. (?)	Beans	Home Canned	4	2	
Miles City, Mont.	String Beans	Home Canned	3	2	
Corona, Calif.	Beets	Home Canned	2	1	
Morro Bay, Calif.	Beets	Home Canned	2	2	
Dayton, Wash.	Beets	Home Canned	5	3	
Lakeside, Ohio	Beets (?)	Home Canned	3	2	
Missoula, Mont.	Beet tops	Home Canned	3	3	
Santa Margarita, Calif.	Green Peppers	Home Canned	2	2	
Zurich, Ont.	Tomatoes (?)	Home Canned	3	1	
Alamosa, Calif.	Corn	Home Canned	84 Chickens and Turkeys		
Joseph, Ore.	Spinach	Home Canned	83 Chickens		

summary [4] showed 12 per cent spoilage in vegetables and meats processed in the steam-pressure cooker. This would seem to indicate that more attention should be given by home economics extension advisers to recommendations for operating such cookers. The mere use of such cooker may not yield sound foods. One of the outbreaks of fowl botulism reported in 1933 resulted from home-canned food processed in a steam-pressure cooker.

Some of the advice given the homemaker on the operation of the pressure cooker is quite interesting if not sound scientifically. For instance, the *Ball Blue Book* advises allowing a tiny stream of steam (known as "bleeding" in factory canning) to escape during processing.* The reason given is as follows: "This is done to prevent

* "Bleeding" is a technical term applied to the act of allowing a small jet of steam to escape from the retort or cooker during processing. In this manner, air pockets and the like are avoided and the operator is more certain that all air is driven out.

FIGURE I



suction which results in drawing liquid from jar." *The Ball Blue Book* recommends a pressure of 10 lb. in the cooker with a processing time of 40 minutes for most vegetables, 60 and 90 minutes for a few others, and 120 for sweet potatoes. This would give a temperature of 240° F. These recommended processing times and temperatures are too low for such foods, processed even under steam pressure under conditions which obtain in the steam-pressure cooker. The *Kerr Home Canning Book* is still more ambiguous. It recommends steam pressure of from 10 to 15 lb. (240° F. to 251° F.) leaving the home-canner to choose which she shall use. The advice "All vegetables and meats canned at home should be boiled 10 or 15 minutes before tasting," is sound and necessary and would seem to indicate that they do not have entire confidence in their recommendations. The cooks which are recommended by both of the books just mentioned are shorter than those recommended by the U. S. Department of Agriculture. The fact that the glass container has a marked retarding effect on the rate of rise of temperature is also important and is not given the significance due it.

Two other methods of processing have been advised since the early days of home-canning—the boiling water-bath and the oven. The boiling water-bath was advised in the earliest bulletins distributed by the U. S. Department of Agriculture. *Farmers' Bulletin 359* advised a 5 hour process in boiling water for vegetables. *Farmers' Bulletin 839* stressed the fact that any food could be canned in the home by methods recommended in that bulletin. Three methods of canning were advised—hot-water-bath at 212° F., water-seal process at 214° F., and the steam-pressure cooker. *Farmers' Bulletins 853* and *1211* retained the methods of former bulletins. *Farmers' Bulletin 1471*,[7] appearing in 1926, showed the effects of consideration of the results of bacteriological researches. The time-tables for processing foods were arranged for acid and non-acid foods. Experience with botulism had indicated that non-acid foods (vegetables and uncured meats) must receive special treatment. *Bulletin 1471*, therefore, went the entire distance and recommended no other method than heating under steam pressure for vegetables and meats.* The controversies which led to this position were reviewed in a former paper.[6] Even though this bulletin, revised in May, 1932, stated emphatically that hot-water-bath processing was not recommended for vegetables, the great majority of extension services and bulletins published by equipment manufacturers carried time-tables for processing in the hot-water-bath and oven. They have not accepted the

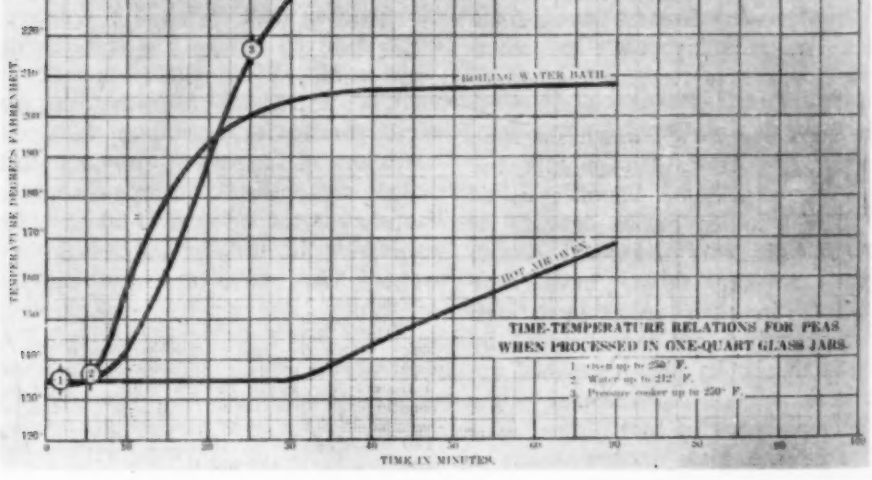
* Recommendations in this bulletin that the home-maker consult the state extension service, in case of doubt, might be questioned. This is good advice only if the extension service happens to be one which has considered all bacteriological knowledge and does not recommend boiling water processes for vegetables. This recommendation has apparently been deleted from recent revisions of this bulletin.

position assumed by the Department of Agriculture. The hot-water-bath process was apparently introduced before much was known about heat penetration. While it may be suitable for acid foods, years of experience with it have shown that it is unsuitable for non-acid foods. It does not sterilize such foods and yields a product in which there is considerable spoilage.

Oven-processing, recommended by manufacturers of some gas ranges and glass jars, is both wasteful and dangerous. Ball Brothers Company recommended this method of processing if the oven is provided with a regulator, since they claim that overheating will cause some "loss of liquid through boiling out of partly sealed jars." They advise starting the time of processing when the required temperature of 275° F. is reached with 3 hours—the maximum heating period for vegetables—even those which have caused many outbreaks of botulism. *The Kerr Home Canning Book* (1933) recommends an oven temperature of 250° F. with a maximum heating time of 240 minutes (4 hours) for any vegetable. They claim that heating temperatures above 250° F. will cause the liquid to boil too hard and evaporate. They also recommend that processing time be counted when the oven is lighted. Such a process might result in undercooked foods. The danger of boiling is probably not serious since the "coming-up time" of the temperature of the jar is so long that 212° F. might not be reached within the recommended time, with some products at least. Furthermore, unsealed foods cannot be heated above 212° F. irrespective of the oven temperature.

Processing of non-acid foods in the oven will not result in a sterile product or in a product which will keep when stored at higher temperatures. It is probably the poorest method that can be advised for cooking canned foods. At the Indiana Agricultural Experiment Station it was found that if the initial temperature of water in a jar processed in the oven was 68° F. and the oven was

FIGURE II


PRESSURE COOKER
BOILING WATER BATH
HOT AIR OVEN
TEMPERATURE DEGREES FAHRENHEIT
TIME IN MINUTES
TIME-TEMPERATURE RELATIONS FOR PEAS WHEN PROCESSED IN ONE-QUART GLASS JARS.
1. Oven up to 250° F.
2. Water up to 212° F.
3. Pressure cooker up to 250° F.

preheated to 275° F., from 95 to 110 minutes were required for the contents of the jar to reach 212° F. as compared with 20 to 25 minutes in a boiling water-bath. With an initial temperature of 158° F. in the contents of the jar, the corresponding times required in the oven and water-bath were from 50 to 55 and from 15 to 18 minutes respectively. These data were secured with water. In foods solidly packed such as spinach, meat, and sweet potatoes, heat penetration would be so much slower that the temperatures at the center of the jar would not reach 100° C. in any processing time which has been suggested by those who use this method.

The success of any method of processing canned foods is determined largely by the rapidity of heat penetration into the container and the thermal destruction time of spoilage microorganisms at the pressure and temperature. This is easily understood when thermal resistance of *Cl. botulinum* at 212° and 240° F. is compared. The resistance of this organism at 212° F. is 360 minutes while at 240° it is only 10 minutes in neutral phosphate solution. Unless sufficient heat penetrates to the center of the jar to destroy microörganisms the product may spoil. Much sound information is available from careful studies long since reported by Ball,* [9, 10] Magoon and Culpepper,[11, 12] and Bigelow, Bohart, Richardson and Ball.[13] These publications cover the subject quite completely and present sufficient data for those advising home-canners, if they will only use them. They need not be reviewed in full, for they are available to anyone interested. Magoon and Culpepper studied the glass jar with various foods.

In order to show the relative rate of penetration of heat into glass jars processed in the steam-pressure cooker, in boiling water at 212° F., and in the oven, the curves shown in Figure II were prepared. They were secured by packing peas in regular quart jars and inserting a thermocouple through the cover to the center of the jar. The jars were then placed in the respective heating units; a preheated standard pressure cooker, a kettle of boiling water, and a gas heated oven preheated to 250° F., for processing. The thermocouples were connected through lead wires to electrical equipment where temperatures at the center of each jar were determined and recorded at frequent intervals during the process. The heating units were operated in accordance with instructions for home-canning except that the pressure cooker was operated at 15 lb. pressure rather than at 10 or 10–15 lb., as suggested in some home-canning books. The oven was preheated in this test although some home-canning books suggest counting time from the time that the cold oven is lighted. The oven was also controlled at 250° F. instead of 275° F., as some home-canning books suggest. Figure II therefore shows the comparable rate of heating of peas in the pressure cooker and in the hot air oven, both operated at the same temperature.

The temperature in the jar located in the hot air oven should not rise perceptably above 212° F., as the container is only loosely closed, and loss of the product will occur if heated above 212° F. The curves indicate that jars placed in an oven really heat more slowly, and do not obtain a temperature during the process above that reached in the boiling water-bath.

The pressure processes suggested for products such as peas should produce adequate sterilization, however, the boiling water processes of 180 minutes or oven processes of 180 to 240 minutes suggested by some of the prominent home-canning books will obtain only from 10 per cent to 16 per cent of the

* Not connected with a firm with a similar name.

sterilizing value of suitable pressure processes.

As the relation of inadequate processing to botulism and the relatively greater difficulty of processing non-acid foods was established, acidification of non-acid foods with lemon juice or vinegar was suggested. Having established that a hydrogen ion concentration of 4.5 had protective action by inhibiting development of *Cl. botulinum*, it was believed that this could be attained by addition of acid. Non-acid foods are highly buffered; consequently such large amounts of acid would have to be added that flavor would be affected. Sunderlin, Nelson, and Levine,[14] for instance, found that acidification of asparagus and sweet corn with phosphoric or citric acid made a 2 hour process satisfactory, whereas without acid even a process time of twice as long was not sufficient.

The U. S. Department of Agriculture since 1931 has been disseminating through *Farmers' Bulletin 1471* (Stanley)[7] satisfactory instructions to the home-canner and the department on frequent occasions has emphatically stated that non-acid foods should be processed only in the steam-pressure cooker. Despite this fact, some concerns making canning supplies to be used in the home, and many agricultural extension services still disseminate unsound, if not dangerous, advice. Dr. A. F. Woods, former Director of Research of the Department placed the department on record as follows:

> There is now no excuse for continuing to take risks involved in canning non-acid foods without adequate pressure cooks.
>
> All recommendations by this department will hereafter make this clear and emphatic.
>
> Government and state bulletins on home-canning have not heretofore specifically disapproved water-bath processes for non-acid products. The attitude now taken by the Federal Department of Agriculture should greatly reduce the danger from understerilization of home canned foods.

The author (Tanner)[6] has already reviewed the situation as far as publications of agricultural extension services and government bureaus are concerned. It was pointed out that only 10 of some 45 states which distribute bulletins on the art of home-canning give methods which take into account sound bacteriological knowledge. These are California, Florida, Maine, Nevada, New York, Illinois, North Dakota, Virginia, Washington, and Texas.* While a few other states have stated that non-acid foods (vegetables and meats) should be processed under pressure, they still give time-tables for hot-water-bath and oven processing. As long as such tables are published, it may be assumed that they are given at least tentative approval and are being recommended to the home-makers of the state.

Another source of information for home-canners are publications distributed by manufacturers of apparatus and supplies for the home-canner, magazine, and newspaper food bureaus. Recommendations of a number of such

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* The author desires to call attention at this time to certain changes which should be made in the former paper. The letter in the table indicating that North Dakota recommends boiling water process for vegetables should be moved to indicate pressure-cooker sterilization. In the context on page 370, this state is mentioned among those with approved recommendations. Virginia should be added to the list in the context making 8 states which distribute sound advice as indicated in the table. The name McCordic (McCordic) should be deleted from the "author" column after Wisconsin. Mrs. McCordic was the author of a Special Circular, November 1932, in which the steam-pressure cooker was recommended for vegetables. Eight months later in July, 1933, *Circular 261, Home Canning and Jelly Making*, was published in which boiling water processes were recommended for vegetables. Both of these publications bear the imprint

"Extension Service of the College of Agriculture
The University of Wisconsin, Madison"

Mrs. McCordic was apparently not the author of the latest publication (*Circular 263*, October, 1933).

Extension Bulletin 183, Extension Service, State College of Washington, June, 1933, apparently supersedes the undated mimeographed material used in the first paper. The steam-pressure cooker is now recommended for non-acid vegetables with processes given in *Farmers' Bulletin 1471*. Information is also at hand that the extension service of Maine now recommends the pressure-cooker for non-acid foods.

authorities are shown in Table II. It will be seen that a few give reliable advice about processing vegetables, recommending only the steam pressure cooker. On the other hand, much unreliable advice is still disseminated even by some of the largest manufacturers of equipment for the home-canner. Some 10 advise oven-processing which is known to be wasteful and dangerous while practically all of them recommend the boiling water-bath. Health officers would be justified in insisting that these authorities avail themselves of all bacteriological knowledge.

Many statements in these publications are both misleading and scientifically unsound. For instance the Kerr Glass Mfg. Corp., in a small booklet, *Modern Method of Home Canning*, by Kerr, states that Louis Pasteur gave us the method of pasteurizing milk and proved that growth of bacteria in foods is the cause of spoilage. It then continues, that Pasteur discovered two fundamentals of successful food preservation—complete sterilization of the product, and perfection of absolute airtight seal. The Kerr principle of sealing is said to insure achievement of these results. Complete sterilization cannot be attained by the process times and temperatures recommended on the later pages of this booklet nor in the much larger *Kerr Home Canning Book*. The type of closure on the jar has very little to do with successful sterilization. It is but one of many necessary requirements for successful canning. It may, however, prevent bacteria from gaining entrance from the outside environment after those in the food have been destroyed by the process. This same book gives as the first step for successful canning: "complete sterilization (entire destruction of all microorganisms such as yeast, bacteria, and mold)." Such a bacteriological utopia has not yet been reached even by factory canners who are using longer cooks.

The recommendation that non-acid foods (vegetables) may be processed in the hot-water-bath and oven, can but lead to a high percentage of spoilage and occasional outbreaks of food poisoning. As long as such processing advice is given in publications, it may be assumed that those who distribute them, recommend them to the home-canner even though they may state that the U. S. Department of Agriculture recommends only the pressure cooker for non-acid vegetables and meats. There is nothing to prevent the home-maker from gaining the impression that a boiling water process is just as satisfactory for non-acid foods as a steam-pressure process. If time-tables are given for such methods of processing, it may be assumed that they are approved. The reader is left to puzzle over the many inconsistent statements.

These statements apply equally well to the *Ball Blue Book of Canning and Preserving Recipes*. It also quotes the recommendations of the U. S. Department of Agriculture to the effect that pressure cookers should be used for vegetables and meats, even though time-tables on hot-water-bath processes for these foods are given. The writer has been informed that canning instructions distributed with the "Presto" jar made by the Owens-Illinois Glass Co., and distributed by the Cupples Co., of St. Louis, are to be made to conform to good canning practice. In their present form they are not acceptable. The statements * made about the publications of several companies in the above paragraphs apply equally well to those of some other manufacturers, as shown in Table II.

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* It has been difficult to determine in some publications whether the boiling water process for vegetables is approved. Statements may be made about the danger of such processing and attention called to the position now assumed by the U. S. Department of Agriculture, yet time-tables be published for boiling water. Where a publication included time-tables for such processing, the author has assumed that this method was approved.

That many of those who recommend procedures to home-canners do not have entire confidence in the products is suggested by the oft-repeated advice, "all vegetables and meats canned at home should be boiled 10 to 15 minutes before tasting," or "thoroughly re-heat all canned vegetables and meats before using." The advice is also given that if home-canned vegetables are desired for salad, re-heat and then cool before using.* The statement that the U. S. Department of Agriculture recommends the pressure cooker for non-acid foods appears frequently. These statements indicate that constant fear of food poisoning obtains in the minds of these "authorities." This fear is justified, for every year inadequately processed home-canned vegetables take their toll of human life.

The publications just mentioned are widely distributed in the United States even in those states where home economics and extension services are endeavoring to disseminate only reliable information. While state authorities are insisting on proper methods of processing, the bulletins and circulars distributed by canning supplies manufacturers may do much to interfere with this program. Despite the fact that many of these bulletins quote the position of the U. S. Department of Agriculture on pressure cooks for non-acid foods, they persist in giving the time-tables for oven and water-bath processing of these products.

Some newspaper food bureaus and magazines also disseminate unsound advice. *Capper's Farmer* for February, 1934, had an article on "Tips on Canning Meat," in which the pressure cooker and boiling water processes are recommended—the latter to be carried out in a wash-tub. Home-makers who follow such advice are bound to have grossly under-sterilized products.

Canning contests are frequently used by some manufacturers and others to stimulate interest in home-canned foods. Foods packed for such exhibitions are judged mainly by color and appearance and not on the basis of sterility. In fact, one home canning instruction book states: "Temperatures higher than boiling tend to injure the delicate color and texture of most fruits." * The implication is then, that color and texture are paramount. Boiling water processes are generally considered to be safe for fruits if the time is sufficiently long.

A part of the unfortunate situation discussed in this paper may be laid at the doors of many departments and schools of home economics. They continue to give in courses and publications advice which is unsound. Many of their graduates are employed by commercial concerns and bureaus disseminating misinformation, and thus the situation is made more serious. Not much improvement can be expected until misinformation is stopped at its source. Those who speak with authority from any position are duty bound to give none but the safest and soundest advice. Fortunately, the situation is beginning to improve. It is significant that the radio is playing an important rôle. The author has heard two talks on home-canning in which the boiling water process was recommended for vegetables. On the other hand, he was told of another in which most trustworthy statements were made.

SUMMARY

The procedures recommended to home-makers of America by some agricultural extension services, newspaper

* This is good advice and is necessary as long as some present methods are used. It is more logical to destroy the organism itself than to attempt to destroy the toxin after it has been formed. The home-maker should make certain that the food has actually boiled for some time. Owing to numerous outbreaks of botulism at high altitudes 10 minutes' boiling may not be sufficient under these conditions.

* Such characteristics should be of secondary importance to keeping quality and health hazards.

bureaus, and manufacturers of supplies for home-canners are reviewed and appraised in light of bacteriological knowledge which has been accumulated during the last 15 years. Since there have been no outbreaks of botulism caused by factory-canned foods in America since 1925, and since home-canned foods cause numerous outbreaks each year, it is suggested that this unfortunate situation may be largely due to inadequate recommendations by some of the authorities mentioned above. Arguments are developed to show that those who disseminate advice to home-canners should realize their responsibility to the public in such matters. Non-acid vegetables and meats should be processed only under steam pressure and not in the oven or boiling-water-bath. Until preservation of perishable food products by heating in wash-tubs, wash-boilers, lard cans, and other such containers is entirely eliminated, outbreaks of food poisoning will continue. Although the U. S. Department of Agriculture has placed itself on record very emphatically as opposed to the use of such methods, and distributes a reliable publication to home canners in *Farmers' Bulletin 1471*, only 10 extension services connected to state agricultural experiment stations have seen fit to adopt similar recommendations; these are California, Florida, Maine, Nevada, New York, Illinois, North Dakota, Virginia, Washington, and Texas.

Attention is also directed to the statements made in many publications of manufacturers of canning supplies for the home-maker. Many of them are not only unsound bacteriologically, but may mislead a home-maker into situations where she may not only subject her family to serious health hazards but pack a product which will show high incidence of spoilage when stored under average conditions in the home. Health officers and other may play a rôle in directing attention to sound practice for preservation of foods by canning in the home.

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Toxicity of Brilliant Green for Certain Bacteria*

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THE purposes of this study are best described in the following resolution adopted during the Annual Meeting of A.P.H.A. in Washington in 1932.

Since the practice of incorporating dyes in culture media for the purpose of growth of certain kinds of bacteria is increasing, and since the value of such differential media is dependent upon the toxicity of these dyes; therefore, be it resolved by the Laboratory Section Council of the American Public Health Association that a committee be appointed to consider the possibility of establishing standards of toxicity for such dyes with especial reference to those used in media recognized by the Standard Methods of Water and Sewage Analysis.†

This paper reports a study of the toxic effect of various brilliant green dyes incorporated in a simple culture medium. Since primary interest concerns the ability of the dye to inhibit growth in various media the emphasis has been placed on bacteriostatic rather than bacteriocidal action.

Bacteriostasis is probably simply a manifestation of vital staining, wherein the reproductive mechanism of the organism is destroyed or at least rendered inoperative. All of the theoretical considerations and experimental evidence that have been advanced regarding the mechanism of staining reactions is applicable in some degree to the present problem. Excellent reviews of literature dealing with this are available.[1, 2]

DETERMINATION OF BACTERIOSTATIC TITER

There are several possible ways of determining experimentally the bacteriostatic powers of various lots of dyes.

1. Measuring the smallest inoculum that will initiate growth—A method previously used by Dunham and open to the drawback that there is no satisfactory way of measuring small inocula except by dilution methods and that these are subject to rather wide chance variations as the number of organisms in the inoculum becomes very small.

2. Measuring the rate of multiplication following a standard inoculum—The method used by Dunham and Schoenlein in their work on bile brilliant green media in 1926 for the Standard Methods Committee of the American Water Works Association.[3]

3. Measuring the lag phase in the presence of dye in relation to the normal lag phase in control media—A method for the quantitative determination of bacteriostatic action recently devised by Mary A. Ingraham, University of Wisconsin.[4]

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* While this was read as a paper, it is also to be considered as a report from the Referee, presented at the request of the Standard Methods Committee, to the Laboratory Section of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 4, 1934.

† With the reorganization of the Standard Methods Committee this problem was assigned to the section on Diagnostic Methods and Procedures and the author was appointed *Referee* for this study. Dr. H. J. Conn, Chairman of the Biological Stain Commission and H. G. Dunham, of the Difco Laboratories, both of whom are pioneers in the field of dye standardization, have served as *Associate Referees*. Advice and assistance have also been received from Harry Jordan of Indianapolis, Dr. Max Levine of Iowa State College, and Frank E. Hale of the Mount Prospect Laboratories of New York City Bureau of Water Supply. The work has all been performed by the Referee in the laboratories of the Cattaraugus County Department of Health, Olean, N. Y.

TABLE I

COMPARATIVE BACTERIOSTATIC ACTION OF TWO BRILLIANT GREEN DYES

	Dye Certification Number		CBg4						NBg5					
			Hours of incubation						Hours of incubation					
		Dilution of dye	24	48	72	96	120	168	24	48	72	96	120	168
a.	Escherichia coli	1:200,000	++	++	++	++	++	++	++	++	++	++	++	++
		1:300,000	++	++	++	++	++	++	++	--	--	--	--	--
		1:400,000	++	++	++	++	++	++	--	--	--	--	--	--
		1:500,000	++	++	++	++	++	++	--	--	--	--	--	--
		1:600,000	++	++	++	++	++	++	--	--	--	--	--	--
		1:700,000	++	++	++	++	++	++	--	--	--	--	--	--
		1:800,000	++	++	++	++	++	++	--	--	--	--	--	--
		1:900,000	++	++	++	++	++	++	--	--	--	--	--	--
		1:1,000,000	++	++	++	++	++	++	--	--	--	--	--	--
		1:1,250,000	++	++	++	++	++	++	--	--	--	--	--	--
		1:1,500,000	-+	-+	-+	-+	-+	-+	--	--	--	--	--	--
		1:1,750,000	-+	--	--	--	--	--	--	--	--	--	--	--
		1:2,000,000	--	--	--	--	--	--	--	--	--	--	--	--
b.	Aerobacter aerogenes	1:125,000	++	++	++	++	++	++	++	++	++	++	++	++
		1:150,000	++	++	++	++	++	+-	-+	-+	-+	-+	-+	-+
		1:200,000	++	++	++	++	++	++	++	--	--	--	--	--
		1:500,000	--	--	--	--	--	--	--	--	--	--	--	--
c.	Citrobacter sp.	1:100,000	++	++	++	++	++	++	++	++	++	++	++	++
		1:150,000	++	++	++	++	++	++	--	--	--	--	--	--
		1:200,000	++	++	++	++	++	++	--	--	--	--	--	--
		1:250,000	++	++	++	++	++	++	--	--	--	--	--	--
		1:300,000	++	++	++	++	++	++	--	--	--	--	--	--
		1:350,000	++	++	++	++	++	++	--	--	--	--	--	--
		1:400,000	++	++	+-	+-	--	--	--	--	--	--	--	--
		1:450,000	++	++	++	++	++	++	--	--	--	--	--	--
		1:500,000	++	++	++	++	++	++	--	--	--	--	--	--
		1:550,000	++	+-	+-	+-	+-	+-	--	--	--	--	--	--
		1:600,000	++	+-	+-	+-	+-	+-	--	--	--	--	--	--
d.	Bacillus subtilis	1:5,000,000	++	++	++	++	++	++	++	++	++	++	++	++
		1:10,000,000	++	++	++	++	++	++	+-	+-	+-	+-	+-	+-
		1:20,000,000	++	++	++	++	++	++	+-	+-	+-	+-	+-	+-
		1:30,000,000	++	++	++	++	++	++	+-	+-	+-	+-	+-	+-
		1:40,000,000	++	++	++	++	++	++	+-	+-	+-	+-	+-	+-
		1:50,000,000	++	++	++	++	++	++	+-	+-	+-	+-	+-	+-
		1:60,000,000	++	++	++	++	++	++	--	--	--	--	--	--
		1:80,000,000	++	+-	+-	+-	+-	--	--	--	--	--	--	--
		1:90,000,000	++	++	++	++	++	++	--	--	--	--	--	--
		1:100,000,000	--	--	--	--	--	--	--	--	--	--	--	--
e.	Bacillus cereus	1:10,000,000	+	+	+	+	+	+	+	+	+	+	+	+
		1:20,000,000	+	+	+	-	-	-	-	-	-	-	-	-
		1:30,000,000	+	+	+	+	+	+	-	-	-	-	-	-
		1:40,000,000	+	+	+	+	+	+	-	-	-	-	-	-
		1:50,000,000	-	-	-	-	-	-	-	-	-	-	-	-

+ Signs indicate bacteriostasis (no growth of bacteria). − Signs indicate growth. Double columns indicate duplicate tubes.

All of these tests in lactose-peptone broth pH 6.9.

4. Measuring the concentration of dye that will inhibit gas formation—The method used by Hale in previous work for the Biological Stain Commission.

5. Measuring the concentration of the dye which will inhibit growth with a standard inoculum.

In devising a procedure to be used in the present studies it seemed that the last method was the simplest and most likely to be properly controlled. The variable factors which might influence the results included—composition and reaction of the media, concentration of the dye, activity of the organisms, composition of the diluent, and size of the inoculum.

OUTLINE OF METHOD

Medium—A base medium consisting of 1 per cent Bacto-peptone and 1 per cent Bacto-lactose was chosen. Unadjusted, it had a reaction of pH 6.9 after sterilization.

The final volume in the test might conveniently be 10 c.c. A number of test tubes were marked at 7½ and at 10 c.c. Ten grams of Bacto-peptone and 10 gm. of Bacto-lactose were dissolved in 750 c.c. of distilled water, tubed in 7½ c.c. amounts and sterilized in the autoclave. After the addition of the dye and the inoculum, sterile water was added to each tube to bring it to a volume of 10 c.c. so that the medium during the time of incubation had the concentration of the simple base medium.

Dye—The dye was used as an aqueous solution in distilled water prepared in volumetric flasks and added to the medium in such dilution that not more than 2 c.c. nor less than 0.2 c.c. was added to each tube.

Inoculum—After the organisms had been established in the simple base medium (1 per cent Bacto-peptone and 1 per cent Bacto-lactose) by a series of daily transfers, a transfer was made and examined at half-hour intervals until a distinct turbidity was noted. A loopful of this culture was then placed on a hemocytometer under a thin cover slip and examined and counted under oil immersion. If the average number of bacteria present was between 1 and 5 per small square (between 4 million and 20 million per c.c.), the culture was diluted with sterile water to which had been added 1 per cent of the base medium so that the final concentration was approximately 200 per c.c. One-half c.c., or approximately 100 organisms, was then used as the inoculum for each tube.

Test—Proper quantities of the dye to give the concentrations desired in 10 c.c. were added to the tubes by means of sterile pipettes. Each tube was then thoroughly shaken. Dilutions of the culture were prepared in the manner described above, and ½ c.c. of the final dilution, approximately 100 bacteria, was added to each tube. The volume of each tube was then made up to 10 c.c. by the addition of sterile water by means of a sterile pipette. The tubes were again shaken (in a mechanical shaker) placed in the incubator, and examined for growth at the end of 24 hours and each day thereafter for 5 days. It is recommended that each test be set up in duplicate. Results are recorded as growth or no growth.

NOTES—The simple peptone broth chosen as the base medium supported excellent growth of all the organisms used.

The above method of estimating organisms is one commonly used for counting vaccines. Slight deviations in the size of the inoculum, 50 to 150 organisms rather than 100, did not materially alter the bacteriostatic titer.

The object of using the young culture was to place the organisms in the dye medium at a time when they were in the logarithmic growth phase at which stage they should be most active. The organisms were diluted in a weak culture medium to protect them against the bactericidal effect of distilled water.

The bacteriostatic action of the dye affects the growth of bacteria during the lag phase. It has been found that after this phase immediate and very heavy growth is apparent so that there is no difficulty in determining which tubes show growth by simple examination.

Materials — The Dye Commission furnished samples of several lots of brilliant green including all of those now on the market and Dunham a sample of the original dye (# 190) that he used in the studies of bile brilliant green media on which the present standard medium is based.

Five different organisms were used, *Escherichia coli, Aerobacter aerogenes, Citrobacter sp., Bacillus subtilis* (Marburg type) and *Bacillus cereus*.

Range of Bacteriostasis—Using the above method high dilutions of the dyes proved to be bacteriostatic. Members of the colon group were usually inhibited between 1:200,000 and 1:400,000, while the spore forming organisms were usually inhibited from 1:10,000,000 to 1:50,000,000. However, test

sets could not always be duplicated in regard to the concentration of dyes which would inhibit or permit growth. For instance, using *Aerobacter aerogenes* and NBg 5, growth was obtained in some series in as low a dilution as 1:25,000 and in other series no growth appeared in dilutions as high as 1:125,000.

Variations within a Test Set—Duplicate tubes within the set usually checked each other very closely but, as would be expected in a biological test of this nature, in a few instances a variation of two or more dilutions occurred.

Aftergrowth effects were frequently encountered wherein tubes negative in 24 or 48 hours would show vigorous growth at later periods. This undoubtedly represented lag phases delayed for periods of 24 hours to a week. It was not surprising to find this as it has frequently been possible to train bacteria to become dye resistant. Working with brilliant green and *Escherichia coli*, Mary V. Reed and Elizabeth Genung have recently reported a multiplication of 250 times in tolerance of the organism for the dye through 13 transfers to stronger and stronger dye media in 56 days.[5]

Comparative Test Sets—When two dyes, CBg 4 and NBg 5, were set up in parallel series CBg 4, exhibited a markedly stronger bacteriostatic effect, whatever organism was used, as can be seen from Table I.

The 8 available dyes were set up against *Aerobacter aerogenes*. Growth extending over a week of incubation appeared very similar to that already shown. The results at the end of 24 and 48 hours incubation are shown in Table II a.

This experiment was repeated using *Bacillus cereus* with results shown in Table II b.

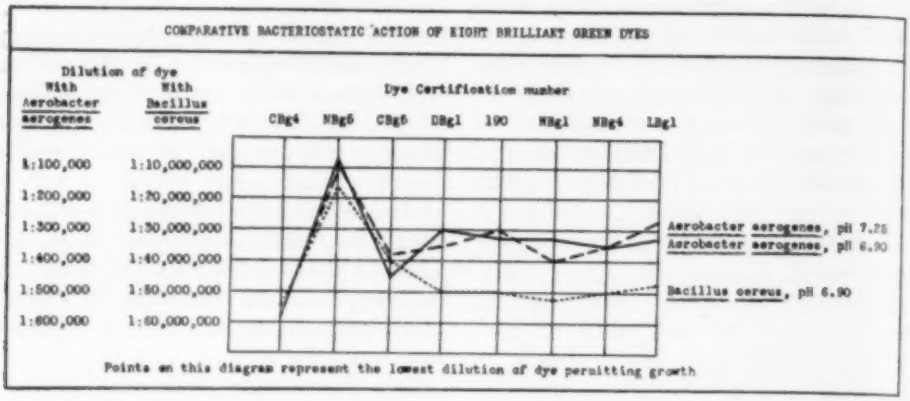
TABLE II

COMPARATIVE BACTERIOSTATIC ACTION OF EIGHT BRILLIANT GREEN DYES

	Dye Certification Number	CBg4		NBg5		CBg5		DBg1		190		NBg1		NBg4		LBg1	
	Hours of incubation	24	48	24	48	24	48	24	48	24	48	24	48	24	48	24	48
	Dilution of dye																
a. Aerobacter aerogenes pH 6.9	1:50,000	++	++	+	−	++	++	++	++	++	++	++	++	++	++	++	++
	1:100,000	++	++	−	−	++	++	++	++	++	++	++	++	++	++	++	++
	1:200,000	++	++	−	−	++	++	++	++	++	++	++	++	++	++	++	+−
	1:300,000	++	++	−	−	++	++	−−	−−	+−	−−	+−	−−	++	−−	++	−−
	1:400,000	++	++	−	−	++	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−
	1:500,000	++	+−	−	−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−
	1:600,000	−−	−−	−	−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−
	1:700,000	−−	−−	−	−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−
b. Bacillus cereus pH 6.9	1:5,000,000	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
	1:10,000,000	++	++	++	+−	++	++	++	++	++	++	++	++	++	++	++	++
	1:20,000,000	++	++	−−	−−	++	+−	++	++	++	++	++	++	++	++	++	++
	1:30,000,000	++	++	−−	−−	++	++	++	++	++	++	++	++	++	++	++	++
	1:40,000,000	++	++	−−	−−	+−	+−	++	++	++	++	++	++	++	++	++	+−
	1:50,000,000	+−	+−	−−	−−	−−	−−	−−	−−	−−	−−	+−	−−	−−	−−	−−	−−
	1:60,000,000	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−
	1:70,000,000	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−
c. Aerobacter aerogenes pH 7.25	1:50,000	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
	1:100,000	++	++	−−	−−	++	++	++	++	++	−−	++	++	++	++	++	+−
	1:200,000	++	++	−−	−−	++	+−	++	−−	++	++	++	++	++	−−	+−	−−
	1:300,000	++	++	−−	−−	++	−−	++	+−	++	++	++	−−	+−	−−	++	−−
	1:400,000	++	++	−−	−−	++	+−	++	−−	++	−−	++	+−	++	−−	−−	−−
	1:500,000	++	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−
	1:600,000	+−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−
	1:700,000	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−

+ Signs indicate bacteriostasis (no growth of bacteria). − Signs indicate growth. Double columns indicate duplicate tubes.
All tests in lactose-peptone broth at the pH indicated.

CHART I


COMPARATIVE BACTERIOSTATIC ACTION OF EIGHT BRILLIANT GREEN DYES
Dilution of dye With Aerobacter aerogenes
With Bacillus cereus
Dye Certification number
CBg4 NBg5 CBg5 DBg1 190 NBg1 NBg4 LBg1
1:100,000 1:10,000,000
1:200,000 1:20,000,000
1:300,000 1:30,000,000
1:400,000 1:40,000,000
1:500,000 1:50,000,000
1:600,000 1:60,000,000
Aerobacter aerogenes, pH 7.25
Aerobacter aerogenes, pH 6.90
Bacillus cereus, pH 6.90
Points on this diagram represent the lowest dilution of dye permitting growth

In view of the fact that brilliant green is commonly used in water analysis in combination with bile at a pH more alkaline than 7.0 it was thought desirable to determine whether the dyes would act the same at a higher pH. Therefore, the above experiment was repeated with a medium of pH 7.25 and essentially the same results obtained, as shown in Table II c.

In order to compare the results given in the last 3 tables the average readings of the tubes shown in those tables are plotted as a curve in Chart I.

DISCUSSION

A method has been presented by which it seems possible to determine the bacteriostatic titer of any given sample of brilliant green. Using this method indications have been obtained that there are distinct differences in the relative toxicity of various batches of this dye. One particular batch, for instance, has been found distinctly more toxic and another distinctly less so than the average run of samples. Data are still too meager, however, to permit definite conclusions at the present time.

It is hoped that other laboratories may be stimulated to check this work and that if possible other methods of measuring bacteriostatic titer can be utilized as a further check. The importance of laboratories doing experimental work recording, in every instance, the lot number of the certified dye which they are using should be again emphasized at this time. The Referees are most anxious to obtain reports of any work which has a bearing on this subject. They in turn will be glad to furnish information on any of the dyes tested to persons interested in bacteriostatic titers.

The dyes which have been used in these experiments include samples of all lots of brilliant green now on the market under certified labels.

The Biological Stain Commission will hereafter refer all samples of brilliant green submitted to them to the Referee, and bacteriostatic titers will be determined and these will be available to any laboratory interested in them.

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The Plague Situation*

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IT is just 40 years since the present pandemic of plague began with the appearance of an epidemic in Hong Kong and just 34 years since it reached California. Arriving in India from Hong Kong it found favorable conditions and soon after 1900 the deaths reached a million per year. Even now after nearly 40 years of continuous activity the deaths from plague in India are occurring at the rate of 3,000 to 4,000 per week. Considered in the light of the known history of plague there is nothing unusual in these facts, nor is there in the length of time it has been continuously present in California any ground for believing that it is dying out and will shortly disappear.

It is characteristic of plague that its period is very slow and the rise and fall of epidemics is measured in decades and centuries. Upon its appearance in a country it is sometimes years before its presence is manifested by any great mortality, and in the subsidence of a pandemic its final disappearance is interrupted by sporadic localized outbreaks. The long range periodicity of plague, as well as its persistence, is well shown in the history of plague in England where it finally disappeared in 1680 after an almost continuous presence for 136 years. The Great Plague of London occurred in 1665 with about 70,000 deaths, but there had been previous to that time and within the 136 year period 5 epidemics with from 10,000 to 35,000 deaths at intervals of 30, 10, 22, 11 and 30 years.

The following from Procopius of Caesarea, in his History of the Persian Wars describing the pandemic of the 6th century—which is the first authentic historical pandemic—is interesting in its parallelism with more modern appearances:

> It arose in Egypt with the inhabitants of Pelusium, then dividing spread one way through Alexandria and the rest of Egypt, the other into Palestine which borders on Egypt, and then traveled over the world always advancing with a progress marked by certain definite spaces of time. For it seemed to advance by a certain law and to demand a certain space of time in every country, discharging its venom against no one on the way casually, but spreading on this side and on that to the uttermost ends of the world as if it feared lest incautiously it should pass by any corner or recess upon earth. It spared neither island nor cave nor mountain top where man dwelt. If it passed over any place only slightly or mildly touching the inhabitants, it returned there afterwards leaving untouched the neighbors against whom it had spent its rage before and it did not depart from there before it made up the full measure of the dead in proportion to the amount of destruction which it had brought on its neighbors. Always beginning at the sea coast it spread into the interior. In the second year it reached Byzantium about the middle of the spring where, as it happened, I was staying.

The great epidemics of ancient times seem to have been of the bubonic form, although it must be remembered that historical accounts of plagues include all epidemic disease, typhus, smallpox, etc., as well as plague, and it is only the description of buboes by some of the writers that identify bubonic plague. Pneumonic plague might have occurred,

* Read before the Health Officers Section of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 4, 1934.

but for authentic accounts of pneumonic plague epidemics we have only comparatively small outbreaks in recent years in Manchuria, in limited districts of India, and on a still smaller scale in California. There are, however, references seeming to indicate that pneumonic plague accompanied some of the bubonic outbreaks and therefore doubtless occurred alone.

Guy de Chauliac in his description of the plague at Avignon, which was part of the second historical pandemic in the 14th century, says:

> The plague commenced with us in January, it continued seven months during which time it appeared in two forms. During the first two months it was accompanied with a continuous fever and with a coughing of blood. All who were attacked died in three days. During the other months the continuous fever was accompanied with tumors and boils which appeared in the external parts of the body, chiefly in the arm pits and in the groin. Those who were thus attacked died in five days.

As with illness of the individual, the prognosis is of great interest and importance to him, so also with the commonwealth, when plague is endemic is a prognosis of interest. Reviewing the past history of the disease an attempt may be made to predict what the future has in store for California and for the rest of the nation. It soon develops, however, that about the only thing that is certain about plague is the uncertainty of its disappearance and that usually about a century is required for it finally to flicker out. This is the history of human epidemics. But how about the endemic foci where plague lies dormant during the intervals between epidemic or pandemic spread? The natural reservoir of plague is in wild rodents of squirrel or groundhog type and the historical foci are districts in Arabia along the Red Sea, in Mesopotamia, in Thibet, in Yunnan in China, and in Uganda in Africa. More recently endemic foci have been established in Manchuria from which the pneumonic epidemics of 1910 and 1916 originated, and in California where the native rodent concerned is the ground squirrel, *Citellus Beechii*.

The rat as a carrier of plague seems to be subject to the rise and fall of epidemics the same as is his human associate. When plague disappears from a human population it leaves the rat population also, but the enzoötic does not exactly coincide with the epidemic. It usually precedes it and is likely to linger longer. The source of human bubonic outbreaks is the rat and the source of rat plague is doubtless contact with wild rodents in some endemic focus. The primary source of plague, therefore, is the wild native rodent and the distributor is the rat which travels in ships and visits all lands. The rat occasionally returns the infection to wild rodents in some new locality, thus establishing a new endemic focus. This happened in California shortly after the introduction of plague into San Francisco about 1900,[1] and presumably the point of contact was in the vicinity of the Port Costa warehouses. At any rate squirrel plague was first found in that vicinity, and the enzoötic soon reached large proportions.

The record of plague in California is as follows:

March, 1900—Bubonic plague appeared in San Francisco, principally in the Chinese colony, and a total of 121 cases with 113 deaths occurred over a period of 4 years.

May, 1907—Bubonic plague again appeared in San Francisco. The total number of cases over a period of 6 months was 160 and the deaths 78. This time it was not confined to Chinatown, but scattered over the whole city.

August, 1908—Plague proven to be present among the ground squirrels of Contra Costa County.

May, 1907, to December, 1918—Sporadic cases of human plague to the

number of 11 with 5 deaths occurred in the counties of Alameda, Contra Costa, San Benito, Santa Clara, San Joaquin, and Stanislaus. Squirrel plague found to be present in the same counties as well as in Fresno, Monterey, San Luis Obispo, Santa Cruz, San Mateo, Merced, and San Francisco.

August, 1919—An outbreak of pneumonic plague in Oakland with 13 cases and 12 deaths.

1919 to 1924, inclusive—Six sporadic cases with 2 deaths occurred in Alameda, Monterey, San Benito, and Santa Cruz Counties.

October, 1924—An outbreak of pneumonic plague in Los Angeles with 32 cases and 30 deaths.

November, 1924—Five cases of bubonic plague with 3 deaths in Los Angeles County.

1925 to 1933—Seven sporadic cases with 5 deaths in the counties of Los Angeles, Santa Cruz, Monterey, and Santa Barbara.

1934—One human case in Tulare County. Also a large epizoötic among ground squirrels of Tulare and Kern Counties, over 200 positive specimens being found among those sent to the laboratory. Furthermore, an epizoötic was discovered among the ground squirrels of Modoc County in the northeastern corner of the state on the eastern side of the Sierras.

This chronology of plague in California shows that we have had 2 bubonic epidemics, the first in San Francisco from 1900 to 1904, and the second in San Francisco and Oakland in 1907 and 1908. We have had 2 pneumonic epidemics, the first in Oakland in 1919, and the second in Los Angeles in 1924. We have had in all 35 sporadic cases with 19 deaths, mostly in rural districts and of squirrel origin, 9 counties being represented. Squirrel plague has been found in 19 counties.

The plague situation on the West Coast is of interest to health authorities throughout the country as will be appreciated by a consideration of what the possible answer is to certain questions which immediately present themselves: First, what is the probability of plague dying out before long? Second, what is the significance of ground squirrel infection? Third, is plague in California a menace to other states?

The answer to the first question is written in the history of plague, and from the brief references to that history already quoted in this paper it may be suspected that the chapter is not finished and may not be for many years to come. This is made all the more certain when it is remembered that there is every reason for believing that the historical epidemics and endemics were rat-borne and in course of time they did come to an end, whereas plague has been kept alive continuously in particular habitats where the rodent concerned was not the rat but a wild native animal such as the marmot. In these localities plague has not, so far as anyone knows, ever completely disappeared. Such a focus now exists in the California ground squirrel.

In answer to the second question we find the most disquieting aspect of the whole problem. In rat plague pneumonia is not a common finding. Guinea pigs inoculated from rats rarely show lung involvement. In squirrel plague pneumonia is common. Guinea pigs inoculated from squirrels very frequently present a pneumonia. The Oakland outbreak of 13 pneumonic cases, which group included 2 nurses and 2 doctors, was started by contact with squirrels, the first man having been squirrel hunting just before his onset. His case was primarily bubonic (axillary) with pneumonia supervening. The Los Angeles epidemic is not so easily traced to squirrels although in the rodent survey following, both rats and squirrels were found infected. There would seem, therefore, to be some

ground for the theory that pneumonic plague is the result of a development of a specific organ virulence on the part of the prevailing strain of *B. Pestis* by passage through a particular species of rodent. In this connection Dr. Wu Lien Teh says [2]:

> The idea that the species of rodents involved in the epizoötics might influence the character of subsequent epidemics is a very fascinating one. Especially it has to be considered if a close relation does exist between epizoötics in certain wild rodents and human outbreaks of pneumonic plague. In fact, a world-wide study of the disease both in rodents and in man as undertaken by our staff within recent years has yielded many data supporting this view. On the other hand, in some countries where only ordinary rats are involved the incidence of lung pest is conspicuous also. But before reaching any final conclusions the following points should be considered: (1) Though ordinary rats are sometimes found to be the original source of pneumonic outbreaks, in many instances the local rodents were not involved, the disease having been imported from outside by human agency, namely, by travelers incubating the disease. (2) How long has the disease existed in the local rats? In some plague areas with rat epizoötics pneumonic plague was frequent soon after the introduction of infection but became rarer afterwards. One might consequently suggest that the longer the infection continues among ordinary rats the less chance there is for pneumonic plague to appear in man.

Finally, the significance of ground squirrel infection, leaving out of consideration any bearing it may have on the type of human plague, lies in the fact that a new endemic focus has been established and these endemic foci, constituted as they are of wild rodent infection, are so far as anyone knows at present permanent and everlasting.

The third query—Is plague in California a menace to other states?—I would answer by saying, yes, for the following reasons: (a) Because of the possibility of direct extension of the disease in the wild rodent population across state lines. We have recently discovered plague among the ground squirrels of Modoc County, 400 miles from the nearest previously known plague area and close to the state lines of both Oregon and Nevada. For all we know it has already crossed over into both states. (b) It may travel by transference to the rats in some borderline urban area, the rats traveling, as is their wont, in freight cars or ships to new and distant localities. (c) The last reason to be mentioned necessitates a return to the epidemiology of pneumonic plague. Teague and Barber,[3] as a result of their investigations in Manchuria, believe that the essential conditions for a rapid spread of pneumonic plague are a low temperature with considerable humidity, thus permitting droplets containing plague bacilli to remain suspended in the air a longer time and at the same time preserving them against the destructive influence of warmth and drying. They point out that the greatest pneumonic epidemic of modern times occurred in Manchuria in the winter of 1910–1911 when the temperature was many degrees Centigrade below zero; also that in India only 2 to 5 per cent of the cases are pneumonic and no large pneumonic outbreaks have occurred there except one with 1,400 deaths in Kashmir at an elevation of about 5,000 feet and in very cold weather. If we accept the plausibility of Teague and Barber's thesis we must admit the possibility of some person during the incubation period of plague traveling east in the winter time. Should this traveler develop an axillary or cervical bubo with a secondary pneumonia, the stage will be set for a rapid man to man transfer of a form of the disease that has no rival in the rapidity of its spread and the certainty of a fatal outcome.

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Rôle of the Sanitary Inspector in the Public Health Program*

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PHYSICISTS tell us that if it were possible for us to rise straight up from the earth at a rate of speed greater than the speed of light, theoretically we should be able, if we could stop our flight and remain stationary, to look downward and see unfolding before us the history of the past. If we could ascend high enough, we should be able to witness important events which took place centuries ago. It would be most interesting if we could, in this manner, look down today upon the health activities of the average small city of 30 or 40 years ago in this country, and follow, up to the present time, the rapid evolution of scientific public health practice which has taken place within the past 3 or 4 decades.

We should see, before the beginning of this rapid evolution, little or nothing of the well developed, efficient, scientific health organization such as we have in most of our large cities and many of the smaller ones today. Looking into the organization and activities of the average small urban community of 40 years ago we probably should see no health department at all. The health officer, if there were one, would be a physician engaged in private practice, employed on a part-time or fee basis chiefly to administer medical care to the indigent and to prisoners in the city jail; or perhaps he would not be even a part-time physician. He might be a lay individual, without training, whose duties would be concerned chiefly with the enforcement of such health laws or regulations as existed at that time. The part-time medical health officer would do some vaccinating when smallpox appeared in the community; he would order cases of smallpox to the pest house; he would direct the sanitary inspector, if there were one, to put up the yellow flags on houses where cases of the more dangerous communicable diseases might exist; he would order the fumigation which must follow every case of contagious disease; and occasionally would direct that all damp places about private premises be thoroughly limed. The sanitary inspector in the smaller cities frequently would be some member of the police force occasionally utilized on quarantine work or inspection of premises.

I can well remember how, as a boy, I used to spend hours cleaning and liming the place where our kitchen sink drained, especially when typhoid fever would appear in the community and we were directed by the city sanitary inspector to "clean up." Most of the people and a considerable number of the health officers of that day still believed that communicable diseases were caused by sewer gas, stagnant ponds and the like. It was quite generally accepted that diseases like typhoid fever

* Read at a Joint Session of the California Association of Sanitarians and the Public Health Engineering Section of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 4, 1934.

could "breed" *de novo* in filth or dampness.

I recall quite vividly the days of the "shot gun" border quarantine maintained by the states when yellow fever would prevail in the South, and I remember seeing mail perforated to facilitate fumigation when it was thought that yellow fever might be transmitted through the medium of a letter. I have heard older officers of the Public Health Service tell of the days when the rock ballast of ships was disinfected with bichloride of mercury, and even a locomotive was swabbed in a disinfecting solution, to prevent the spread of yellow fever. In the meantime, the stegomyia mosquito—since, in keeping with progress, given the more up-to-date name of *Aëdes aegypti*—went merrily along with its business of spreading the deadly "yellow jack." It had not generally become known that malaria is a mosquito-borne disease, and people still feared the "night air" from swamps. The green scum on a pond was considered deadly. Milk was given little consideration as a possible vehicle of infection. When an epidemic of typhoid fever occurred in a small town it seldom excited suspicion that the municipal water supply might be polluted. Sewage was piped to the nearest creek or river and a sewage disposal plant was a refinement rarely seen. No one thought of the insanitary privy as playing an important part in the spread of intestinal infections in small towns and rural communities. Most of the "outhouses," as they were called, were of the open-back type; the excreta were deposited on the ground and the accumulations were removed only when it became absolutely necessary.

At that time, although considerable progress had been made in the identification of the organisms causing many of the communicable diseases, comparatively little was actually known of the epidemiological factors responsible for their spread. Communicable disease control consisted, in large measure, in effort to prevent the spread of infection by application of police measures to prevent contact—isolation and quarantine—and in terminal disinfection, chiefly fumigation.

Then came the challenge of efficiency of police methods from Dr. Charles V. Chapin, recently retired as Health Officer of Providence, R. I., after 40 years of distinguished service, who presented an entirely new conception of scientific control of communicable diseases and demonstrated the soundness of his views by putting them into practice in his own community. Rapid progress began to be made in working out and establishing the epidemiology of many of the communicable diseases. Gorgas, Carter, and LePrince showed the way in the control of mosquito-borne diseases in Cuba and in the Canal Zone. Lumsden, of the Public Health Service, demonstrated in Yakima County, Wash., that the prevalence of typhoid fever could be reduced in large measure in rural and semi-rural communities by installing sanitary privies.

Stiles discovered the widespread existence of hookworm disease in the southern states, and the Rockefeller Foundation brought forward the sanitary privy as a means of protecting the population from this scourge. It is interesting to note that the full-time county health unit of today had its beginning largely out of the early work done by the Public Health Service and the Rockefeller Foundation and the state health authorities coöperating with them to improve excreta disposal conditions in the rural areas. At about the same time the importance of other purely environmental factors in the spread of communicable diseases began to be more widely recognized. The need for certain technical knowledge and training not possessed by the medical health officer became apparent, and

the result was the development of the public health engineer. The duties of the sanitary inspector underwent a revolutionary change and he began to find an important place in a scientific program for the real control of communicable diseases.

The sanitarian of today who would intelligently plan measures for the control of communicable diseases must constantly bear in mind the fundamental truth that the perpetuation of every communicable disease is dependent upon 3 factors: (1) the existence of a source of infection—the sick individual, the "carrier," or the infected animal; (2) the availability of susceptible individuals or animals; (3) the existence of a means of transmission of the infection from the sick to the well. These factors may be likened to the links of a chain in which the infected individual or animal and the susceptible host take the part of rings, joined together by the events of communication. New links are constantly being added as the infection is communicated from one individual to another; and the forging of the chain continues indefinitely unless the progress of the disease can be interrupted by removing one or more of the links. The point at which the chain may be broken most easily varies with the particular disease with which we may be dealing. In some instances the only practicable method of attack available lies in an attempt to remove the source of infection—by isolating the infected individual or rendering him non-infective through treatment; in others, the elimination of the susceptible human host through immunization, or the eradication of animal hosts, such as rodents responsible for the spread of bubonic plague and typhus fever, may present the most effective means of breaking the chain; while in still another group of diseases the greatest promise of success lies in efforts to interrupt communication of the infection from the sick to the well by removing the channels through which the infection may be carried. Some of the communicable diseases present opportunities for attack at 2, or perhaps all 3, points in the chain; and here one may elect to direct his control activities at 2 or 3 points, or he may choose to concentrate his attack on what he believes to be the most vulnerable single link.

The determination of what may be the most effective method of attack must be based upon thorough knowledge of the epidemiology of the disease. Since certain diseases, or groups of diseases, can be transmitted only through more or less definitely established channels, or may present only limited opportunities for breaking the chain of infection, efforts toward control must be specific if they are to be effective.

The public health administrator must know where the attack can be directed to best advantage in the control of each disease, and, if his facilities are limited, he must be prepared to choose wisely in selecting methods and determining the point or points upon which he will concentrate his activities.

I am reminded of the story about the highly specialized mechanic who was called in, after a number of others had failed, to determine what was wrong with a certain complicated engine which could not be started. After examining the engine very carefully for a few minutes, this mechanic selected a particular part of the engine and struck one blow with his hammer, whereupon the machine started immediately. He then rendered a bill for $500 for his services. The owner of the engine objected to what he thought was an overcharge and demanded an itemized statement. The statement received read, " Five dollars for one tap, and $495 for knowing *where* to tap! "

We know now that the control of communicable diseases must be based upon thorough knowledge of the epi-

demiological characteristics of each disease and that our control activities must be specific to be effective. We have learned that some diseases will yield most readily to environmental sanitation—the safeguarding of water and milk supplies, improvement of excreta disposal conditions, eradication of animal hosts, and the like; that others may be controlled effectively only through protection of the susceptible human host; and that in still others the only hope of success at present lies in control of the sick individual by isolation or treatment, or in reducing mortality through the prevention or management of the serious complications of certain acute infections. We have gained a new conception of what the control program of the modern health department should be and have seen that the program of today must bring into play the combined resources and activities of the health officer, the sanitary engineer, the sanitary inspector, the public health nurse, and the practising physician.

The sanitary inspector of this day is, or should be, least of all, just an inspector and a law enforcement officer. If he is experienced and wise, he knows that an attempt to perform public health work through law enforcement alone does not produce the best results. After all, accomplishment in much of our public health procedure lies in what we may be able to persuade the individual to do for himself. The trick behind success in public health work, as well as in all other movements for the public welfare where coöperation of the individual is essential, is leading people to do things because they *wish* to do them.

There is a very definite place for the sanitary inspector of today in the modern program for the control of communicable diseases. Just as the public health nurse is taking the place of the old-time quarantine officer in the application of control measures carried out in the home and school and making for herself a well defined and essential position in the health department, so the sanitary inspector, if he be assigned to proper duties, can become one of the most important and essential components of the organization for control of communicable diseases in his community. To make his work effective, however, his part in the program must be just as carefully planned and defined as any other activity of the health department. The "hit and miss" activities of other days were wasteful and ineffective.

The sanitary inspector should have definite objectives toward which he may work. I like to look upon the sanitary inspector as the executive for the health officer and the public health engineer; in the local health department he may be likened to the construction engineer, who takes the architect's design and specifications and builds a bridge or a modern "sky-scraper." The health officer and public health engineer study the health problems of the community; they determine which of these problems are most important and what measures must be applied to solve them and single out certain epidemiological factors to be controlled; and to the sanitary inspector is assigned the duty of applying the measures required in reaching the objective. Thus we see the sanitary inspector, in his proper rôle, not merely inspecting dairies, but undertaking to produce a safe milk for his community; not merely inspecting premises, but making it his business to see that there is a safe, sanitary means of excreta disposal and a safe water supply for every home in his jurisdiction. In the southern states we also see him carrying out a well planned program for the eradication of the malaria carrying mosquito.

Too often we have seen the sanitary inspector serving as the chauffeur for the health officer because the latter liked

to have company, or for the nurse because she could not drive a car. Or perhaps it has been convenient to have the inspector around the office to perform odd jobs and do the errands. In many health departments it is still the practice to use the sanitary inspector chiefly as a "trouble-shooter"—to answer complaints and investigate nuisances—and the health officer has no plan of work for him. Since the health department is a service organization, often dependent for its continued existence to a considerable degree upon the good will and moral support of the people, these minor complaints cannot be ignored, even though the nuisances may have little or nothing to do with the health of the community. Every health department should capitalize opportunities to render service to individuals and be pleasant about it. At the same time, the waste of effort on the investigation of nuisances should be reduced as far as possible by patiently educating the public and creating the demand for service that gives real health protection to the community.

In my opinion, a sanitation program can be carried out successfully only when it is made a part of the activity of a complete local health organization, operating under the direction of a full-time trained health officer. The proper approach to the control of disease in every community is a study of the problems of that particular community. When the special problems have been determined and the plans have been laid, the activities of the sanitary inspector then can be directed where they will be most effective. The work of the sanitary inspector can become one of the most important parts of an essential welfare service, and such an officer may have the satisfaction of rendering a very real and necessary service to humanity if his activities are directed in the proper channels and he knows where and when to "tap."

Nutritive Value of Dried Fruits*

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THE palatability, keeping quality, and low cost of dried fruits result in their extended consumption, particularly in winter, and in parts of the world not well supplied with fresh fruits; consequently the nutritive value of these foods assumes some significance to those concerned with public health. Changes in such value brought about by the methods used in drying must be known and improvements suggested to prevent loss.

Such a research project was begun in 1927 at the University of California with the assistance of funds provided by the Purnell Act, and was continued until 1933 when it was discontinued for lack of funds. During these 6 years the main effort was directed toward the determination of the effect of various methods of drying upon the vitamin content of the fruit.

The method used was quite uniform, the Division of Fruit Products of the College of Agriculture being responsible for the procuring, experimental drying, and chemical analysis of the samples, and the Department of Household Science for the actual biological testing. In all cases fresh fruit from the same orchards was preserved by freezing storage as representative of the original condition of the fruit. Peaches and prunes of the crop of 1927, and apricots and prunes of 1928, were tested for vitamins A and C, apricots again in 1929 and in 1930, Calimyrna and Kadota figs in 1929 and black Mission figs in 1930. Thompson seedless grapes and raisins were prepared and tested in 1931 for vitamins A, C, B, and G, as were Kadota and Adriatic figs of 1932. In addition some work has been carried on during the last year upon B and G content of peaches and apricots and a thorough study of the B and G content of commercially dried California prunes has been made. The vitamin content of Asiatic and California grown dates of known history, crop of 1930, has also been determined.

Altogether, peaches of 2 crops, apricots of 4, prunes of 4, 4 kinds of figs of 3 crops, raisins and dates each of 1 crop have been secured, dried and stored under known conditions and tested by standard biological methods for vitamins A and C, and in some cases also for B and G.

The chief questions were:

1. What proportion of each of these 4 vitamins present in the fresh fruit is retained in the sun-dried or dehydrated products?
2. What advantage, if any, has artificial dehydration over natural sun-drying?
3. What effect has the use of sulphur dioxide during the drying process upon each of the vitamins?
4. What happens to the retained vitamins during the cooking and processing of some of these dried fruits?
5. Does sun-drying develop any antirachitic activity in these fruits?

* Read before the Food and Nutrition Section of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 3, 1934.

TABLE I

SUMMARY OF VITAMIN A RETENTION IN DRIED FRUITS

Fruit	Amount containing 1 International unit of Vitamin A			Vitamin A retained
	Fresh	Dried	Equiv. in fresh wt.	per cent of amt. in fresh
	mg.		mg.	
Peaches (Muir)	100–160	Unsulphured, dehydrated	178	90
		Unsulphured, sun-dried	177	90
		Sulphured, dehydrated	140	100
		Sulphured, sun-dried	186	86
Prunes	100 or less	Sulphured, dehydrated	109	91
		Sulphured, sun-dried	163	61
		Unsulphured, sun-dried (commercial type)	222	45
		Unsulphured, sun-dried	232	43
		Unsulphured, dehydrated	240–420	41–24
Apricots	25 or less	Sulphured, dehydrated	49–123	20–51
		Sulphured, sun-dried	118–144	16–21
		Unsulphured, dehydrated	146	16
			gm.	
Thompson seedless grapes	2,000	Dehydrated, sulphured and unsulphured	2.0	100
		Sun-dried, sulphured	10.2	20
		Sun-dried, unsulphured	13.6	15

6. What effect has the preparatory lye dipping of prunes, raisins and other fruits upon their vitamin value?

Definite answers have been found to most of these questions as regards vitamins A and C and in large measure also for vitamin B (B_1), but not so definitely as yet for G (B_2). The technic of testing for the group of B vitamins is apparently not so satisfactory as those for A and C, although the use of pigeons in testing for the antineuritic vitamin (B_1) assists materially in that case.

It is now quite obvious that the vitamins have distinct and discoverable chemical structures, each of which has apparently no relation to that of any of the others. It cannot be anticipated therefore that any procedure or reagent should have either an equally adverse or protective effect upon all of the vitamins; nor is it necessarily true that the same vitamin will be affected to the same degree in different fruits, since the concomitant substances which may enter into the reaction may well vary in kind and amount in the various fresh fruits.

Our findings may be summarized as follows:

1. As shown in Table I, the retention of vitamin A was 86 to 100 per cent, in all dried peaches whether sun-dried or dehydrated, sulphured or unsulphured; ranged from 60 to 90 per cent in the sulphured and from 25 to 50 per cent in the unsulphured prunes; and was lower, about 25 per cent, in the apricots.[1, 2, 3] The vitamin A of apricots is most variable in its response to various conditions but it is extraordinarily rich in the fresh fruit and even after considerable loss is found in

TABLE II
SUMMARY OF VITAMIN C RETENTION IN DRIED FRUITS

Fruit	Method of preparation	Minimum daily dose required to protect against scurvy	Vitamin C retained during drying
		gm. (equivalent in fresh fruit)	per cent
Peaches	Fresh (frozen)	5–8	100
	Unsulphured, dehydrated, and sun-dried	up to 40 gm. tried	0
	Sulphured, dehydrated, and sun-dried	6–12	100
Prunes	Fresh (frozen)	10–20	100
	Lye-dipped, sulphured, dehydrated & sun-dried	11–17	100
	Not lye-dipped, sulphured, dehydrated & sun-dried	17–32	0 to 50
	All unsulphured products	up to 40 gm. tried	0
Apricots	Fresh (frozen) 1928 crop	up to 30 gm. tried	0
	Fresh (frozen) after evacuation, 1929 crop	10–15	100
	All products with less than 500 p.p.m. SO_3	up to 72 gm. tried	0
	All products with more than 500 p.p.m. SO_3	14–17	100 (compared with 1929 fresh)
	All unsulphured products	up to 72 gm. tried	0

the dried product. Morgan and Madsen[2] showed that the vitamin A activity of this fruit is almost exactly commensurate with its carotene content, a fact also noted by Brockmann,[4] who stated that the apricot is the richest vegetable source of this provitamin. The vitamin A of dried yellow peaches is quite uniform almost regardless of preparation, and that of prunes is only slightly affected, the unsulphured prunes retaining about 30 per cent less vitamin A than do the sulphured. However, in commercial practice sulphured prunes are but little in use.

Quite similar but as yet unpublished data have been accumulated with reference to Thompson seedless raisins[10] and 4 varieties of figs.[11] Dehydration has been found definitely more favorable to vitamin A retention than sun-drying, and sulphuring in nearly all cases is an additional protective factor.

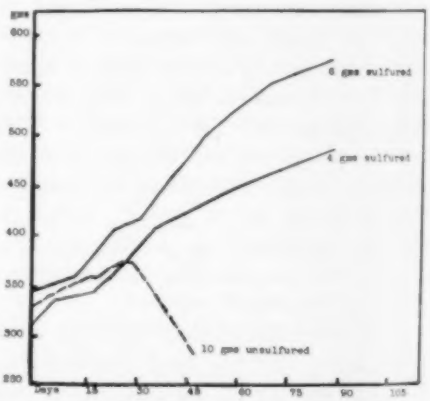

FIGURE I—Average weight curves of guinea pigs fed sulphured and unsulphured dried apricots as sole source of antiscorbutic vitamin. The daily doses are given opposite the curves. Four to 10 animals were used for each dose.

Grapes like apricots are peculiarly subject to oxidative changes, and only dehydrated raisins were found to retain significant amounts of vitamin A. Only the dark Mission figs are well endowed with this vitamin and the sulphured product retains a significantly larger amount thereof than the unsulphured, 31 as compared with 20 per cent. The variety, rather than the horticultural or drying conditions, was found to determine the provitamin A value of dates.[7]

2. Vitamin C is nearly completely lost in both sun-drying and dehydration except in the sulphured products.[5, 6] Again the sulphured peaches were found most likely to retain the full antiscorbutic property of the fresh fruit, with sulphured prunes next and apricots least. Figures I and II represent typical experiments with sulphured and unsulphured fruit. As shown in Table III, the protective action of the sulphur dioxide was not apparent in apricots unless 470 p.p.m. were retained in the dried product.[6] In no case was it possible to demonstrate a significant amount of vitamin C in the dried figs, either sulphured or unsulphured, although in 3 varieties, Kadota, Calimyrna, and Adriatic, a fair amount is present in the fresh fruit.[11] Neither dehydration nor sulphuring was effective. There may be some unusually effective oxidative catalyst in this fruit. Similar results were found with the Thompson seedless grapes and raisins [10] and no conclusions could be drawn about the preservation of the vitamin in this fruit because of its rapid destruction even in frozen storage and its low value in the fresh fruit. Dates also were negative as to vitamin C.[7]

Apparently nearly the same conditions hold for the preservation of vitamins A and C. Both are heat labile, readily oxidized and therefore protected by rapid relatively low temperature drying, that is, dehydration, and the presence of a reducing reagent such as sulphur dioxide.

3. Vitamin B has been recognized as distinct from G for only a few years. Our first systematic tests for the presence of this substance in fruits were

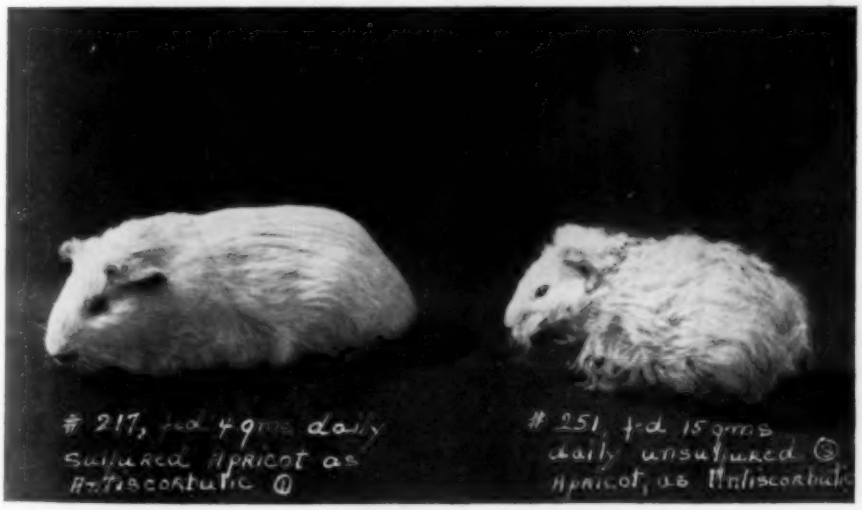

FIGURE II—Typical guinea pigs fed dried apricots as source of vitamin C. The animal on the left received 4 gm. daily sulphured apricot, that on the right 15 gm. daily unsulphured apricot.

TABLE III

VITAMIN B (B_1) CONTENT (BY RAT ASSAY) OF DRIED FRUIT AS AFFECTED BY SO_2

Fruit	Amount fed daily gm.	Number of rats	Initial (depleted) weight gm.	Final weight gm.	Gain or loss gm.	Period days
Unsulphured raisins	1.0	5	71	92	21	56
	1.5	26	59	93	34	56
	2.0	23	56	95	39	56
	2.5	9	74	116	42	56
Sulphured raisins	1.5	3	61	44	−17	22
	2.0	10	54	43	−21	28
	3.0	10	67	52	−15	30
Unsulphured dried peaches	1.0 or 2.0	9	64	49	−15	30
	3.0	5	78	67	−11	52
	4.0	4	69	114	45	56
Sulphured dried peaches	2.0 to 6.0	18	66	50	−16	20

made in 1931. Thompson seedless grapes and raisins were tested and it was expected that the sulphured products would show at least as good retention as the unsulphured. To our surprise almost complete destruction of this vitamin had occurred in the sulphured raisins, and quite good preservation, about 60 per cent of the original, in the unsulphured or natural products (Table III). Similar although less clear-cut results were seen in the studies of figs, peaches, and apricots. Typical data on sulphured and unsulphured raisins examined for vitamin B activity by pigeon test are shown in Table IV.[10] This outcome might have been predicted from the scattered suggestive

TABLE IV

VITAMIN B (B_1) CONTENT (BY PIGEON ASSAY) OF RAISINS AS AFFECTED BY SO_2

No. of birds	Daily dose required for maintenance				Retention of Vitamin B of fresh fruit per cent
	Wheat germ alone gm.	Fruit		Equiv. in fresh fruit gm.	
		Type	gm.		
6	0.7–0.9	natural raisins	7	25	64
4	0.7–0.9	sulphured raisins	7 and 0.5 gm. wheat germ	76	21
3	0.7	fresh grapes	16	16	100

reports of the relative stability of vitamin B_1 to oxidation particularly in acid reaction. Its well known instability in alkaline solution is apparently not due to oxidative but to some other type of change. Protection by sulphur dioxide or other reducing agents could not therefore be predicted, but actual destruction under these circumstances was not expected. However, there are faint indications in the literature that reducing agents may break down antineuritic activity—for example, Levene and Van der Hoeven's finding [8] that omitting hydrogen sulphide treatment of lead acetate saturated concentrates increased the amount of vitamin left in the filtrates. A parallel destructive effect was seen in a rice polish vitamin B concentrate treated with gaseous sulphur dioxide.[10]

On the whole, dried fruits are not a rich source of vitamin B, with the possible exception of unsulphured raisins and prunes. These 2 varieties are of about equal value, containing about 1 Chase and Sherman unit per gram.

4. *Vitamin G*—Our data as to vitamin G (B_2) are not adequate for the full evaluation of the effect of methods of drying. Apparently this substance is quite resistant to change and is therefore little affected by sulphuring, dehydration, sun-drying, or lye dipping. Prunes are the only fruit we have so far tested which is sufficiently rich in vitamin G to allow a real estimation, and in this case only the commercial dried product has been used. A photograph is shown in Figure III of littermate rats after 7 months' test,[12] one without source of vitamin G, the other fed 2 grams of prunes daily as sole source of G.

Guha [9] has reported recently that vitamin B_2 is not destroyed by sulphur dioxide, nitrous acid, hydrogen peroxide, ozone, nor long continued heating even under increased pressure, particularly at pH of less than 7.

The first 3 questions, namely as to the effects of sulphuring, dehydration, and sun-drying upon the 4 vitamins in various fruits, have now been answered so far as our data will allow. The fourth question, that of the effect of cooking, has been answered in detail for A and C in sulphured and unsulphured apricots.[3] The same protective effect exerted by the sulphur dioxide upon vitamins A and C during drying was seen also in the open kettle cooking of the sulphured fruit (Figure IV). The loss of retained sulphur dioxide by the fruit during storage and cooking was found to be relatively great so that the product as eaten is likely to contain only traces. Commercial storage for 6 months at room temperatures and processing and re-sulphuring were found to

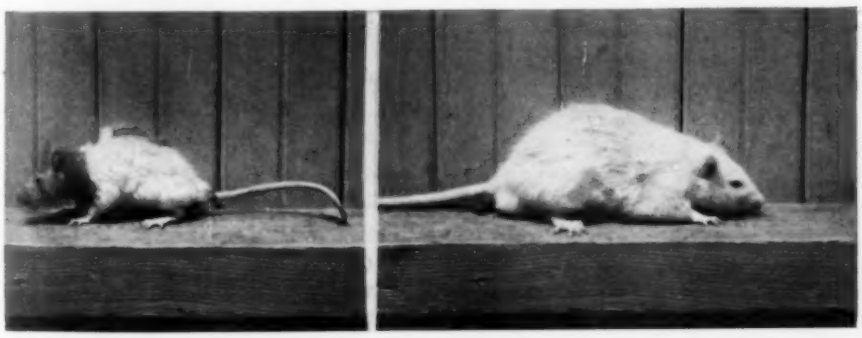

FIGURE III—Litter mate rats after 7 months on vitamin G free diet, the animal on the right having received in addition 2 gm. of prune flesh daily, that on the left no addition to the basal diet.

reduce the antiscorbutic value of the fresh fruit 50 per cent. No measurable reduction in vitamin A was caused by processing and resulphuring (Figure V).

The fifth question, as to the possible development of antirachitic activity in the sun-dried fruit, was considered in apricots and dates. Some of the dates had been sun-dried in Asia and some in California. Only traces of vitamin D were present in any of these dried samples [7] and the sun-dried were if anything less active than the dehydrated. Another answer might be found perhaps if other samples were tested.

The sixth question, as to lye dipping, is easily answered. It was tested on prunes and raisins and the process as practised was found to be either inert or favorable to the preservation of vitamins A, C, and B.[5, 6] The A and C of lye-dipped prunes were better protected by subsequent sulphuring than were the undipped, and the lye dipped raisins were somewhat better sources of both A and B than the otherwise similarly prepared but undipped fruit. The effect may be in the direction of increasing digestibility in the unsulphured fruit and increasing penetration of the protective sulphur dioxide in the sulphured fruit.

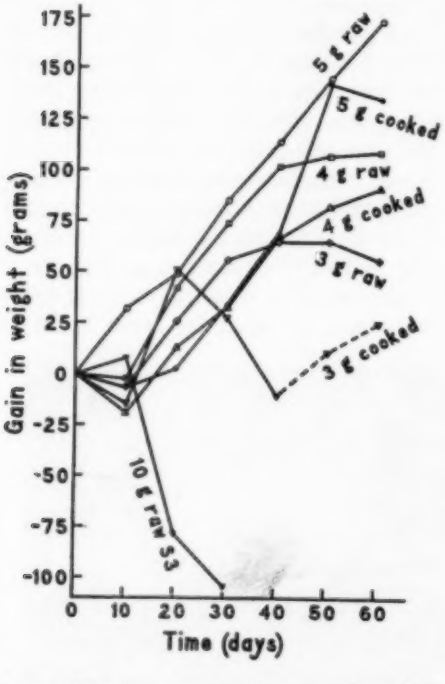

FIGURE IV—Average growth curves of guinea pigs fed various quantities of raw and cooked sulphured, dried apricots, S2 and raw, unsulphured apricots S3 as source of vitamin C.

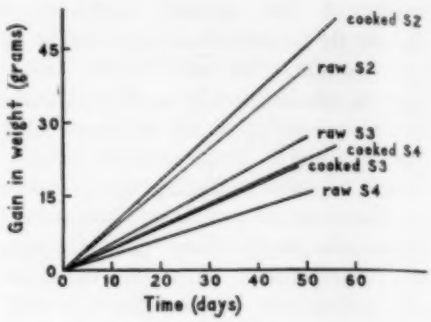

FIGURE V—Average weight increases of rats fed 22.5 mg. daily of raw and cooked dried apricots as source of vitamin A; sulphured sun-dried, S2; unsulphured, sun-dried, S3; processed, sulphured, sun-dried, S4.

No sweeping statements can be made about any of these drying methods, because the nature of the fruit and of the vitamin concerned provides a different set of conditions in each case. Vitamin A is most adversely affected by sun-drying, particularly in apricots and raisins; it is favorably affected by sulphuring and by lye dipping. Vitamin C is largely destroyed in all fruits by any form of drying unless sufficient sulphur dioxide is present, and in that case also perhaps in figs and raisins. Vitamin B (B_1) is adversely affected by sulphuring, but less so by sun-drying than the other vitamins. Vitamin G is apparently indifferent to all the processes involved, but except in prunes is not found in notable amounts in either the fresh or dry fruits so far studied.

What practical advice may be offered therefore to the producer and consumer of dried fruits? Obviously each fruit must be considered on its own merits and prepared by that method which will retain the largest proportion of its best natural endowment. Peaches and apricots should be dehydrated and sulphured to retain their excellent natural content of vitamins A and C, even though their small B content be largely lost. Raisins should not be sulphured but should be lye-dipped and dehydrated to preserve their good vitamin B and A content, and should not be counted on for vitamin C. Prunes should be lye-dipped, not sulphured, and dehydrated also since their natural endowment is similar to that of raisins. Figs which are not rich in either A or C should be unsulphured and either dehydrated or sun-dried. The black Mission figs however contain enough vitamin A to merit dehydration.

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Rapid Growth

. . . The philosophy which dominates the field of nutrition assumes that a young animal which grows rapidly is the ideal for maximum health both during the growing period and during adult life. This philosophy has developed under the influence of several stimulants. . . .

A third stimulus whose importance may be overlooked is that of commercial advertising. While preparing this note I selected at random one of the copies of the *Journal of the American Medical Association,* which is published weekly. More than a fifth of the advertising in this journal was devoted to fortified foods for children, chiefly for defenseless babies that are more or less easily coerced into engulfing various vitamin concentrates. It must be possible to market such products. Who can estimate the effectiveness of such constant advertising in the journal of the American physician in creating and moulding his philosophy and his recommendations in feeding children? Is it any wonder that the pediatrician has become an advocate of rapid growth? Even the manufacturer of scales does his part by buying space in this same professional journal in order that no one shall neglect to keep his child up to date in weight. Thus has been created an enthusiasm for growth and growth stimulants. And what profit in dollars can be made from any other philosophy?—Dr. C. M. McCay and Mary F. Crowell, Prolonging the Life Span. *Scient. Month.*, Nov., 1934, pp. 405–406.

Beverage Bottling and Beer Dispensing*

Covering the Everyday Problems of the Sanitary Inspector

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THE general term "bottling" includes not only glass bottles but every other container used for beverages. If new containers were used entirely there would be few problems for the sanitarian. The unfortunate practice of re-using bottles, and the source from which the second-hand bottles come, are matters of great importance to the bottler and to the public. Cleanliness and sterility of the container is necessary for the prevention of spoilage and the preservation of flavor and color of the beverage. With carbonated beverage, beer, and water bottlers, the containers are usually returned to the plant from which they came within a short time and seldom put to any other use. With wine, ginger ale, lime rickey, and several other beverages, plain bottles are used with no identification marks and no regular method of return, and these are often put to other uses.

In bottles that have been picked up by junk collectors, liquids of almost every description are found, such as oils, paint, chemicals, and drugs, often with flies and other insects, and dirt dried so hard that ordinary washing methods fail. As these bottles are returned ultimately to some bottling plant, cleansing and sterilizing becomes of utmost concern. The larger bottling plants having mechanical equipment with the use of caustic, high temperature, sufficient time for soaking, adequate rinse, and close inspection to remove any dirty bottles, are able to obtain clean sterile containers. Even in these plants the effort to cut down manufacturing costs frequently causes them to be careless in maintaining proper caustic balance, correct temperature or renewing solutions.

The bottling trade, and the health authorities also, are much indebted to the research work of the Association of the American Bottlers of Carbonated Beverages through the Fellowship maintained at Ames College, in obtaining a standard washing formula. Legislative bodies in many states, counties, and cities have adopted the A.B.C.B. code as a law governing beverage bottling. Briefly, this requires a 2½ per cent caustic solution at a minimum of 120° F. for a period of not less than 5 minutes. Variations from this standard may be made where a higher temperature, more caustic, or a longer soak is used. As the object is a clean, sterile bottle it is not so important that the law be followed to the letter; but in case of failure, the fact that there has been a violation of the legal requirements places a strong weapon in the

* Read at a Joint Session of the California Association of Sanitarians and the Public Health Engineering Section of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 4, 1934.

hands of the inspector to enforce compliance.

In the smaller plants, and where large bottles such as gallon and 5 gallon demijohns are handled, and machine washing is not used, hand washing with a brush and a good cleansing solution in tepid water followed by a thorough rinse with clean water, then immersion in a chlorine solution of not less than 50 p.p.m. of available chlorine, will give satisfactory results.

The essential points of plant inspection are: location of building—free from objectionable surroundings, of substantial construction, thoroughly ratproofed and screened from insects; floors to be of cement or material impervious to moisture and sloped to a drain; rooms for preparing syrups, etc., to be separate; employees to be clean in person and habits. Samples for bacteriological examination should be taken of the water supply before and after filtering or treating, and after carbonation to locate sources of contamination. Tests for sterility of washed bottles should be made frequently. The inspector should be equipped to make tests at the plant for caustic content of wash solution, for presence of alkali in the rinsed bottle, and for the amount of available chlorine where this method of sterilization is depended upon.

It is important that the operators provide for the inspection of the bottles before they are filled and of the finished product to detect the presence of any foreign substances. In spite of all precautions, many specimens have been found on the market, or have been brought by the public to the attention of the health department, containing clothes pins, rusty nails, rubber brush tops, hairs from brushes, flies, spiders, broken glass, cork, varnish, and many other foreign substances.

Wine bottling at the winery, liquor bottling at the distillery and rectifiers or at the bonded warehouse, need little attention, as new glass is invariably used. Many practices and methods used in wine and liquor manufacturing should be discouraged, and by the tactful suggestion of the inspector much improvement may be made.

Beer bottling at the brewery is also well taken care of with adequate equipment. However, many small concerns attempt to bottle beer, shipped in bulk to lessen transportation costs, without adequate equipment for cleaning, old bottles invariably being used with hand operated filling and capping devices. Unless there are regulations prohibiting, this will lead to many difficulties for the sanitary inspector and many complaints of spoilage from the public.

Oranges are probably the hardest of all fruits from which to obtain a fresh juice for beverage purpose without contamination by bacteria and molds from the peel. To wash in a cleansing solution with brushes, to rinse, sterilize, and dry before cutting, seems the only solution. This requires expensive equipment, time and labor, bringing the cost to a point where competition by less conscientious operators makes it prohibitive. Only by the adoption of state-wide laws can any degree of perfection be expected.

Under the present code regulations it is impossible for the fresh fruit juice manufacturer to buy fruit from the packing-house at by-product prices. This forces him to patronize peddlers who buy from growers outside the Association, consequently he gets culls of poor quality, scale infested, not processed, many picked from the ground where there is the possibility of contamination from the fertilizers used. Reports show excessively high plate counts, often *B. coli* and invariably molds. Only by the washing process can this be avoided. Such juice is usually put up in milk bottles with paper caps. The bottles and filling equip-

TABLE I

WASH WATERS AND RINSE WATERS

Date	Number	Kind	Temp.	No. Bac. per c.c.	B. coli (Direct)
7/31	351	Wash	...	7,600	0
"	353	Wash	...	16,900	0
"	354	Rinse	...	3,830,000	30,000
"	355	Wash	120	0	0
"	356	Wash	80	10,000	0
"	357	Rinse	80	40,000	0
"	358	Wash	...	1,200	0
"	359	Rinse	...	60,000	0
8/1	250	Wash	92	70,000	1,900
"	251	Rinse	84	2,480,000	3,700
"	252	Rinse	78	8,420,000	30,000
"	253	Wash	85	4,700	0
"	254	Rinse	115	51,200	0
"	255	Wash	85	100	0
"	256	Rinse	102	130,000	0
"	257	Rinse	98	700,000	0
"	258	Rinse	...	530,000	0
"	360	Wash	80	37,120,000	1,100
"	361	Rinse	85	58,240,000	3,200
8/2	259	Wash	120	200	0
"	260	Rinse	78	230,000	0
"	262	Wash	...	20,480,000	0

ment should be handled as in milk plants, by methods well defined in laws and ordinances covering the dairy business.

Sources of trouble in plants may be enumerated as follows:

Bottled Water Plants—Springs and wells—covering to prevent entrance of flies and other insects and birds, protection against rodents and other animals, overflow pipes to be so arranged as to prevent any possibility of back flow or flooding, methods of handling corks, sterilization of filling taps, regularity of reconditioning water filters.

Breweries—Rodent infestation around the grain and malt storage buildings and outbuildings, drainage and facilities for flushing, loading platforms or rooms, frequent removal of all waste materials.

Grape Presses and Wineries—Disposal of waste, protection from and extermination of flies, ventilation of wine fermenting and storage rooms, floor drainage and methods and means for cleaning presses and vats.

BEER DISPENSING

The repeal of the 18th Amendment has changed the conditions covering the dispensing of drinks at soda fountains and restaurants and added beer parlors to the already numerous places for dispensing beverages. By efforts of the Health Department the methods of washing glasses and

GLASS AND DISH WASHING REPORT

	Total Insps.	Wash Water				Rinse Water			
		Hot	Warm	Tepid	Cold	Hot	Warm	Tepid	Cold
Last half of June.....	3,120	1,824	789	48	444	2,043	552	25	406
First half of July.....	1,491	726	484	157	113	1,052	246	53	99
Last half of July.....	1,129	590	304	132	65	751	217	51	55

dishes has been brought to a very high standard through the use of hot water, soap or other cleansing materials, and a hot-water rinse. In serving beer in large and heavy glasses, frequent breakage and also the desire to have a cool glass have caused the dispensers to discard the use of hot water.

This has caused a falling off in the standards for all glass washing. The report on glass and dish washing methods obtained through inspection by extra men allotted through one of the S.E.R.A. projects, is as follows: Water was classified as "hot," being 120° or too hot for the hands; "warm" between 100 and 120°; "tepid" below 100°; and "cold" as drawn from the faucet, being below 70°.

Following this report surprise inspections were made by regular inspectors; temperatures were observed; and samples were taken. It was found that in a few instances temperatures above 100° were being used; often there was no cleansing agent; glasses were being dipped in cold water, then in a cold rinse, and the wet glasses used without

TABLE II

REPORT ON METHOD AND PRACTICE IN STERILIZING BEER AND WINE GLASSES, APRIL 24, 1934

Sample	*Sterilizing Agent*	*Cl. p.p.m.*	*Bacteria per c.c.*	*B.C. Index*
1225	Steri-Cl	50	1	
1226	Sanisol	15	29	
1227	Steri-Cl	10	2	
1228	" "	75	Sterile	
1229	Bicarb.	...	275,000	
1250	Hygeia	0	4,490,000	
1231	Cl. lime	100	Sterile	
2818	.....	...	11,000	Pos.
2817	Hy-Pro	70	0.0	
2819	Steri-Cl	140	0.0	
2816	H.T.H. 15	20	0.0	
2814	H.N.O.	Trace	5	
2811	?	0	18,000	
2810	?	0	14,000,000	
2813	Sal Soda	0	2,400,000	Pos.
2812	" "	...	16,000,000	
2740	Sanisol	20	2	
2754	"	100	0.0	
2815	T.S.P.	...	4,400,000	Pos.
2738	Steri-Cl	315	0.0	
2739	" "	260	2	
2753	" "	...	100	
2752	" "	...	100	
2741	" "	90	10	
2758	" "	340	100	
2757	" "	...	100	
2742	Sal Soda	...	440	
2755	Steri-Cl	100	0.0	
2743	" "	145	7	
2744	" "	140	6	
2750	" "	...	300	
2749	Cl. Lime	25	150	
2756	None	...	Innumerable	
2748	Purex	Trace	1,750	
2751	"	...	300	
2747	None	Trace	Innumerable	
2746	"	Trace	"	
2745	"	Trace	"	

being drained. Laboratory reports on wash and rinse waters in practically all cases showed a bacteria count in the millions with a positive *B. coli* index. Following these reports numerous arrests were made and convictions obtained.

The report on samples taken at the time of arrest is shown in Table I.

Note the results on samples taken with regard to the sterilizing agent used in wash or rinse water in Table II.

It will be noted that where a chlorine content of even as low as 15 p.p.m. was used, the bacteria count was 0 or very low, and where cleansing agents with no chlorine were used, the count was invariably high, with often a positive *B. coli* index.

From these reports, in addition to thorough washing in a cleansing solution, a chemical sterilizer should be required where live steam is not available, even in the case of mechanical dish washing machines. The practice of refilling glasses is objectionable and should be prohibited, because glasses are often mixed and do not reach the original user and also because the beverage drying on the glass will often affect the taste and appearance when refilled. The used glass may contaminate the faucet through the foam while being filled as it rises above the top and over the faucet.

A cooling bath (after cleansing and sterilizing during which glasses are immersed in ice water until used) is especially to be discouraged, as tests have shown this water to be teeming with bacteria. A dry chill cabinet should be provided. Wiping of glasses with a towel is bad practice and brewery interests recommend serving beer in a wet glass. Beer when delivered in barrels should be immediately placed under refrigeration and kept at a low temperature until served. While beer distributors usually maintain a coil cleaning service, the inspector should know that such cleaning is regularly practised. Adequate toilet facilities for both sexes should be required and well maintained.

The coöperation of the brewer, restaurant and other trade associations should be solicited to raise the standard of dispensing beverages at this time as the trend is in the opposite direction, and unless earnest effort is made practices will be established which will undo much of the good that has been accomplished through years of work.

Referring again to bottling and the use of reclaimed or second-hand glass bottles or containers of any kind for any food products, legislation to prohibit their use unless washed and sterilized by standard methods, and to license dealers only when approved equipment is installed, should be urged.

Public Health Degrees Granted in 1934*

THE following tables similar to those published in previous years present the data concerning students registered in schools of public health, and the public health degrees granted in the calendar year 1934.

COLLEGE ENROLLMENT IN PUBLIC HEALTH COURSES

The number of students enrolled, and Public Health Degrees conferred in the year 1934 in courses requiring at least 1 year of residence, by American and Canadian Colleges:

TABLE I

	No. of Students Registered 1933–1934				*No. of Degrees Granted 1934*		
Name of University	*Men*	*Women*	*Total*	*Degrees Offered*	*Men*	*Women*	*Total*
University of California	0	13	13	A.B.	0	7	7
				M.A.	0	0	0
				Ph.D. in Hyg.	0	0	0
				Dr.P.H.	0	0	0
Columbia University	8	1	9	M.S. in P.H.	6	1	7
Harvard School of Public Health	14	1	15	C.P.H.†	6	0	6
				M.P.H.	7	0	7
				Dr.P.H.	1	0	1
Johns Hopkins School of Hygiene and Public Healtn	57	15	72	C.P.H.	34	3	37
				Dr.P.H.	6	0	6
				Sc.D. in Hyg.	9	7	16
				Sc.M. in Hyg.	2	4	6
Massachusetts Institute of Technology	49	9	58	C.P.H.	0	4	4
				Dr.P.H.	0	0	0
				M.S.	3	0	3
				S.B. in P.H.	9	0	9
				S.B. in San. Eng.	5	0	5
				Ph.D.	0	0	0
Stanford University ‡	0	0	0		..	..	0
University of Michigan	37	22	59	Dr.P.H.	3	0	3
				M.S.P.H.	6	6	12
University of Minnesota	7	2	9	B.A. or B.S.	0	0	0
				M.A.	1	0	1
				M.S.	0	0	0
University of Pennsylvania ‡	0	0	0		..	..	0
University of Toronto	12	4	16	Ph.D.	3	0	3
				D.P.H.	12	1	13
University of Western Ontario	0	0	0	D.P.H.	0	0	0
Wayne University College of Medicine and Surgery **	2	0	2	Dr.P.H.	2	0	2
Yale School of Medicine	7	6	13	C.P.H.	4	1	5
				Dr.P.H.	3	1	4
				M.S.	0	0	0
				Ph.D.	0	0	0
Total	193	73	266		119	38	157

* Prepared by the Committee on Professional Education
† Harvard does not give the C.P.H. as a degree
‡ Discontinued for 1934
** Formerly Detroit College of Medicine and Surgery

CLASSIFICATION OF PUBLIC HEALTH DEGREES GRANTED IN 1933

The number of persons receiving degrees by reason of public health courses taken, classified according to the nature of the degree conferred:

TABLE II

Degree	*No. of Degrees Granted*	*No. of Schools Offering Degrees*
Certificate of Public Health	52	4
Doctor of Public Health	16	7
Master of Science in Hygiene	6	1
Doctor of Science in Hygiene	16	1
Doctor of Philosophy	3	4
Bachelor of Science	14	2
Bachelor of Arts	7	2
Master of Arts	1	2
Master of Science	22	5
Master of Public Health	7	1
Diploma of Public Health	13	2
Total	157	

Number of Degrees conferred by American and Canadian Colleges for 1932, 1933, and 1934:

TABLE III

School	*Degree*	*1932*	*1933*	*1934*
University of California	A.B.	3	1	7
	M.A.	0	0	0
	Ph.D. in Hyg.	0	0	0
	Dr.P.H.	0	0	0
Columbia University	M.S. in P.H.	6	7	7
Harvard School of Public Health	C.P.H.*	4	8	6
	M.P.H.	7	11	7
	Dr.P.H.	0	2	1
Johns Hopkins School of Hygiene and Public Health	C.P.H.	33	41	37
	Dr.P.H.	5	3	6
	Sc.D. in Hyg.	12	13	16
	Sc.M. in Hyg.	1	8	6
Massachusetts Institute of Technology	C.P.H.	0	9	4
	Dr.P.H.	0	0	0
	M.S.	3	1	3
	S.B. in P.H.	9	13	9
	S.B. in San. Eng.	0	0	5
	Ph.D.	1	1	0
University of Michigan †	Dr.P.H.	3	2	3
	M.S.P.H.	17	16	12
University of Minnesota	B.A. or B.S.	..	..	0
	M.A.	1	3	1
	M.S.	1	..	0
	Ph.D.	..	1	..
University of Pennsylvania †	M.A.	4	3	0
	M.S.	..	1	0
	Ph.D.	1	1	0
	Dr.P.H.	0	..	0

* Harvard does not give the C.P.H. as a degree
† Discontinued in 1934

TABLE III
(Continued)

School	*Degree*	*1932*	*1933*	*1934*
University of Toronto	Ph.D.	..	0	3
	D.P.H.	14	10	13
	M.A.	..	2	..
University of Western Ontario	D.P.H.	0	0	0
Wayne University College of Medicine and Surgery ‡	Dr.P.H.	0	1	2
Yale School of Medicine	C.P.H.	2	6	5
	Dr.P.H.	0	3	4
	M.S.	0	1	0
	Ph.D.	6	4	0
Total		133	172	157

‡ Formerly Detroit College of Medicine and Surgery

Number of Degrees in Public Health granted in United States and Canada, 1932, 1933, and 1934:

TABLE IV

Degree	*1932*	*1933*	*1934*
C.P.H.	39	64	52
Dr.P.H.	5	9	16
M.S. in Hygiene	1	8	6
Sc.D. in Hygiene	12	13	16
Ph.D.	8	7	3
B.S.	9	13	14
B.A.	3	1	7
M.A.	5	8	1
M.S.	27	26	22
M.P.H.	7	11	7
D.P.H.	17	12	13
Total	133	172	157

W. S. LEATHERS, M.D., *Chairman*
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ALLEN W. FREEMAN, M.D.
RALPH TARBETT
CLARENCE L. SCAMMAN, M.D.
HUNTINGTON WILLIAMS, M.D.
LILLIAN A. HUDSON, R.N.
WILSON G. SMILLIE, M.D.
THOMAS PARRAN, JR., M.D.
JOHN SUNDWALL, M.D.
WILLIAM P. SHEPARD, M.D., *Consultant*

Status of Standards* of the American Public Health Association, January, 1935

THE following is a list of standards of the American Public Health Association, the date of publication of the last edition and the expected date of revision. Unless otherwise stated, all standards appeared in the *American Journal of Public Health*.

Standard	*Date of Publication* †	*Expected Revision*
Minimum Qualifications for Those Appointed to Positions in Public Health Nursing	May, 1931	1936
Essential Features in the Design of Sanitary Drinking Fountains	*1930–1931 Year Book*	Under consideration
Standard Classified Nomenclature of Disease	1933—Outside Publication	1935—completed
Standard Methods for the Examination of Water and Sewage	1933—Seventh edition	1936
Standard Methods of Milk Analysis	1934—Sixth edition	1937 or 1938
Lead Poisoning, Standards for Diagnosis, Individual Treatment and Industrial Control	1930—pamphlet	Under consideration
Standards for the Design, Construction, Equipment and Operation of Swimming Pools	1930—pamphlet	No information
Standard Regulations for the Control of Communicable Diseases	1926—pamphlet 1932—(reprinting)	1935
Standard Methods for the Examination of Shellfish	July, 1922	1935
Standard Methods for the Examination of Air	January, 1917; May 1920	1935
Standard Definition of Terms Used in Sewerage and Sewage Disposal Practice	October, 1917 1927—A.S.C.E.	Indefinite
Standards for Teaching Vital Statistics	June, 1925	1935 or 1936
Report of the Committee on Salary Standards	August, 1922	Indefinite
Report of the Committee on Standard Preparation of Diphtheria Antitoxin	June, 1922	No information
Report of the Committee on Standard Methods of Examining Disinfectants	July, 1918	Indefinite
Report of the Committee on Standard Methods for the Bacterial Diagnosis of Glanders	May, 1915	Indefinite
Report of the Committee on Standard Methods for the Diagnosis of Rabies	June, 1911	1936
Report of the Committee on Bacterial Methods for Miscellaneous Food Products	November, 1917	To be dropped
Standards of Mechanical Plant Filtration	November, 1916	Under consideration
Standard Nomenclature of Causes of Death	1929—Outside publication	1939

* Prepared by the Committee on Research and Standards preparatory to undertaking necessary revisions. Members of the Association are requested to communicate comments, criticisms, corrections and suggestions for new standards to the *Chairman* of the Committee on Research and Standards, Abel Wolman.

† Most recent edition

Isolation of Streptococci from Milk*

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THE isolation of streptococci from milk frequently becomes a problem due to the presence of other bacteria. Provided that the material has been collected with the proper aseptic precautions the isolation is readily made from individual cow specimens, but in examining composite samples from producers' cans prior to pasteurization, or herd samples, the development of streptococci is often obscured by the luxuriant growth of other microörganisms.

There are several means of isolation: simple dilution of the sample, the addition of a substance to the milk to prevent growth of undesired flora prior to the cultural examination and the use of differential media.

Dilution of the sample often results in the loss of the streptococci before the extraneous bacteria become sufficiently few in number to allow the former to be detected. The use of glycerol to form a 30 per cent solution with the milk, as has been recommended for the preservation of members of the abortus-melitensis group,[1] has been found to be applicable also to streptococci.[2] Brilliant green and gentian violet have been used successfully for the same purpose.[3] The great advantage in the use of these substances is that the samples may be sent through the mail exposed to room temperature without an appreciable altering of the results. By using a differential medium,[4] an interpretation based upon the number of colonies of streptococci present may be obtained. Such a medium usually depends upon its dye content for the inhibition of the undesired flora, and since the bacteriostatic action of dyes is often irregular the efficiency rests largely upon very careful standardization of the dye content of each lot prepared. For a similar reason it is essential that the final dilution of a dye be correct when it is added to a milk sample.

In a laboratory where a small staff and limited facilities for media making are important factors the preliminary treatment of milk samples with sodium carbonate, followed by the isolation of the streptococci upon routine blood agar,[5] has been found to give excellent results. A 1 per cent solution of sodium carbonate has been used by other workers[6] when only the streptococcal content of feces were desired. Adapting this technic to a similar procedure for milk, the following method has been found to be most satisfactory when composite samples or herd samples are to be examined for the presence of streptococci.

One c.c. of a thoroughly mixed sample may be used. Preferably, however, the gravity cream is removed and 1 c.c., emulsified in a test tube containing 10 c.c., of a freshly prepared sterile 1 per cent solution of sodium carbonate of tested purity. In the original method as applied to the examination of feces incubation at room temperature for 24 hours is recommended. It has been noted that if the milk-sodium carbonate mixture is placed in an incubator at

* Originally presented at the mid-year meeting of the New York State Association of Public Health Laboratories, Albany, N. Y., November 4, 1932.

37° C. overnight, growth of the streptococci (if present) occurs and Gram negative bacilli are destroyed. Following this procedure sub-cultures from the carbonate solution are made upon blood agar plates and the isolation completed in the usual manner.

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2. Gilbert, R., and Clark, M. E. The Use of Glycerol as a Preservative for Milk Samples to be Examined for Hemolytic Streptococci. *A.J.P.H.*, 23, 7:720, 1933.

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Palo Alto Annual Report

BY the middle of February the Health Officer of Palo Alto, Louis Olsen, has released copies of his 24 page annual report for the calendar year 1934. Last year this city won first award in its population class in the Health Conservation Contest sponsored jointly by the U. S. Chamber of Commerce and the American Public Health Association.

Palo Alto is spending $.93 per capita in its Health Department, the appropriation of which represents 3.6 per cent of the city budget. In this college town of 15,900 population there were no resident deaths from diphtheria nor any of the other common communicable diseases. The Health Officer states that his diphtheria immunizations are done under a uniform plan followed in Santa Clara County, whereby the family physician does the immunization for a nominal sum and the Health Department furnishes the material.

In 1934 poliomyelitis was a problem on the Pacific Coast. There were 6 cases reported in Palo Alto with no death. There were reported 127 deaths from all causes in the city with a rate of 8.0. The birth rate was 10.9 which is below the 10 year average of 11.6.—H. F. V.

A Central Information Service on Current Practices of Health Departments*

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THE present economic depression and the attending changes in social philosophy have accelerated the adjustments in budgets and programs of health departments which normally occur in a more orderly fashion. Health administrators, more than ever before, feel the need of current information on the status and practices of health departments throughout the nation as a guide in meeting their local situations. Strange as it may seem, there has never been developed in this country any comprehensive national system for reporting data of special interest to health officials, other than morbidity and mortality. Attempts at collecting more extensive information on health administration so far have usually taken the form of periodic cross-section surveys,† except for those county health departments which are required to report to state and national contributing agencies. The U. S. Public Health Service has required fairly complete reports from county health departments to which the Service extends financial assistance, and much of the data derived in this manner are presented annually in the *Public Health Reports*.

It is accepted as a principle by the Committee on Administrative Practice that a comprehensive system of reporting to be effective and permanent must eventually become a function of an agency in the federal government which is equipped for collecting data of this type and making the findings available. Pending the establishment of such a national reporting system, the committee felt that the resources of the American Public Health Association might be utilized for preparing the way and determining the types of information which could be obtained with relative ease and yet meet the more urgent needs of health officials. A special sub-committee, known as the Sub-Committee on Current Practices of Health Departments, was therefore appointed for the purposes just indicated.

A preliminary study was made to find a few summary measurements which would express activity and at the same time supply data for answering the more common inquiries. In analyzing the inquiries received from health officials, it was found that the information desired most frequently related to health department budgets. Next in the order of frequency were questions concerning personnel. It was also found that, when figures on budgets are extended to in-

* Abstract of Report of Sub-Committee on Current Practices of Health Departments of the Committee on Administrative Practice. The author is Chairman and the other members of the Committee are: E. L. Bishop, M.D., Louis I. Dublin, Ph.D., Allen W. Freeman, M.D., George T. Palmer, D.P.H., and John L. Rice, M.D.

† See references at end of article.

FIGURE I—CARD (FRONT) USED FOR RECORDING DATA CONCERNING EXPENDITURES AND PERSONNEL OF HEALTH DEPARTMENTS

Name of Health Jurisdiction

Address: State City Street

Name of Health Officer

Population Served by H.D. (19) (19) (19) (19)

EXPENDITURES FOR FIELD SERVICE	19			19			19			19		
	Expenditure	Per Cap	% of Total	Expenditure	Per Cap	% of Total	Expenditure	Per Cap	% of Total	Expenditure	Per Cap	% of Total
Administration												
Vital Statistics												
General Sanitation												
Food, Drugs, Milk												
Child Health Supervision												
Adult Health Supervision												
Communicable Disease Control												
Tuberculosis												
Venereal Diseases												
Laboratory												
Health Education												
Public Health Nursing												
Sub Total												
Other Field Services (specify)												
Sub-total												
Grand Total Field Services												

clude amounts allocated to different services, and when personnel are reported by professional classes and time devoted to duty, these simple data constitute reliable indices by which to judge progress or retrogression over a period of years. Information on services is extremely desirable, but the collection of such data from health departments and the analysis would add materially to the cost. Furthermore, its value may be questioned since there are no generally accepted definitions for activities and no standard method for recording or reporting service items of health departments. It therefore seemed best for the present at least to concentrate attention on data pertaining to funds and personnel, and to begin the formulation of definitions which might be used later in the recording and analysis of service items.

Fortunately, data on funds and personnel meeting the requirements just set forth come to the office of the American Public Health Association each year, in connection with the Inter-Chamber City Health Conservation Contest.* The schedule used in connection with the contest also provides for reporting a limited number of services common to health departments, but these are not being studied by the Sub-Committee on Current Practices of Health Departments at the present time.

CENTRAL OFFICE RECORDS

It must be understood that the primary purpose of this sub-committee is to assist in the development of a central agency for collecting and recording up-to-date information on health departments which might be of use to persons occupying administrative positions in health agencies. In connection with this basic function, a summary card file (Figures I and II) is kept current in the office of the American Public Health Association for all cities in the Inter-Chamber City Health Conservation Con-

* The contest was extended in 1934 to counties and rural districts having organized health departments

FIGURE II—CARD (BACK) USED FOR RECORDING DATA CONCERNING EXPENDITURES AND PERSONNEL OF HEALTH DEPARTMENTS

EXPENDITURES FOR INSTITUTIONS AND CLINICAL SERVICES	19			19			19			19		
	Expenditures	Per Cap	% of Total	Expenditures	Per Cap	% of Total	Expenditures	Per Cap	% of Total	Expenditures	Per Cap	% of Total
Tuberculosis Hospitals												
Communicable Disease Hospitals												
General Hospitals												
Other Institutions & Clinical Serv. (specify)												
Total Institutions												
Grand Total—Field, Instit'l & Clin. Serv.												

PERSONNEL (Salaried Employees in Field Service)

PERSONNEL CLASSIFICATION	19				19				19				19			
	F. T.	Salary Range	P. T.	Total	F. T.	Salary Range	P. T.	Total	F. T.	Salary Range	P. T.	Total	F. T.	Salary Range	P. T.	Total
Physicians																
Veterinarians																
Engineers																
Sanitary Inspectors																
Nurses																
Laboratory (Technical)																
Clerks (All types)																
Other Employees																
Total																

test. It is the expectation that the number of reporting cities may be increased by other means in addition to the contest. The hope is expressed that the Sub-Committee on Current Practices of Health Departments may find its greatest field of usefulness in supplying information direct from its files to health administrators. While publication of data is only incidental to the main purpose, which is recording, certain summary reports will be issued from time to time.

A preliminary review was made of the data collected through the contest to determine changes in size of budget occurring during the years 1930, 1931, 1932, and 1933. The remainder of the report will be devoted to a presentation of a few findings.

EXPENDITURES BY OFFICIAL AGENCIES

Total and per capita expenditures through official health agencies are given in Table I. Included in this table are expenditures through official health agencies for services other than hospitalization, institutional care, medical relief, garbage collection and disposal, capital outlays and deficits. Expenditures by boards of education for medical and nursing services are included also, but not expenditures for physical education and health instruction. In brief, the expenditures are for services constituting the generally accepted public health program of most urban communities. These services were: administration, vital statistics, general sanitation, control of food, drugs, and milk, child health supervision, communicable diseases, tuberculosis, venereal diseases, and laboratory. Inasmuch as some cities appear in each of the 4 years of the contest while others may be entered for 1, 2, 3, or 4 years, direct comparisons of figures for 1 year with those of another therefore must be made with due caution. Furthermore, the number of small cities is not sufficient to constitute a reliable sample. Notwithstanding the shortcomings in the basic data, it seems entirely proper to make certain general observations regarding the adequacy of

funds for health services and the variation in amount from year to year.

There is a remarkable uniformity in the average per capita expenditure of the cities in all groups. Group I reports the highest expenditure; Group IV, next; and Group VI, the lowest; but the differences are very slight. The picture changes, however, if maximum and minimum expenditures by different groups are compared. While the spread between the two extremes is marked for all groups, both the highest and the lowest per capita expenditures are reported by the small cities in Groups V and VI. Attention, however, is again called to the small number of cities in the latter groups and the consequent unreliability of the sample. There also appears to have been some selection of cities in Groups V and VI with large per capita expenditures, thus distorting to some extent what is probably the true situation for these groups as a whole. In this connection, it may be well to mention the fact that a small city reporting a high per capita budget may still have an inadequate service since fixed charges for even a minimum health organization, when distributed over a small unit of population, are certain to result in high per capita expenditures.

While the figures presented in Table I are based on accumulated totals for different cities each year, it would seem that appropriations either continued to increase or remain stationary through 1931. Some drop in appropriations occurred in 1932, but the fall was very decided in 1933. By internal economies, the health departments probably were able to compensate for the small reductions made prior to 1933, but in that year it is apparent that there must have been serious disorganization of staff and consequent impairment of

TABLE I

A COMPARISON OF TOTAL AND PER CAPITA EXPENDITURES FOR HEALTH SERVICES * BY OFFICIAL AGENCIES † FOR THE YEARS 1930, 1931, 1932, 1933

Group	*Year*	*Number of Cities Reporting*	*Population Represented*	*Total Expenditures*	*Average Per Capita Expenditure (In Cents)*	*Maximum Per Capita Expenditure (In Cents)*	*Minimum Per Capita Expenditure (In Cents)*
I—500,000 and over	1930	9	8,681,122	$7,304,295.38	84.1	117.1	41.5
	1931	8	10,173,557	9,767,642.27	96.0	125.2	61.0
	1932	9	10,552,687	9,183,987.15	87.0	100.5	41.3
	1933	9	10,710,253	7,576,869.34	70.7	118.0	36.3
II—250,000 to 500,000	1930	16	5,514,738	4,460,489.80	80.9	180.2	53.0
	1931	18	6,106,546	4,958,926.61	81.2	183.3	40.6
	1932	9	10,552,687	9,183,987.15	87.0	100.5	41.3
	1933	12	4,046,490	2,962,972.45	73.2	169.8	37.7
III—100,000 to 250,000	1930	26	3,687,963	2,808,576.22	76.2	170.4	35.3
	1931	26	3,614,393	3,068,661.15	84.9	176.2	36.2
	1932	20	2,905,684	2,293,105.03	78.9	151.5	38.0
	1933	18	2,523,295	1,892,747.90	75.0	158.4	21.1
IV—50,000 to 100,000	1930	28	1,842,596	1,499,542.31	81.4	147.6	27.8
	1931	29	1,905,001	1,550,728.78	81.4	143.6	25.4
	1932	20	1,296,450	1,014,720.30	78.3	188.8	19.9
	1933	15	1,025,118	816,851.36	79.7	144.7	35.2
V—20,000 to 50,000	1930	40	1,210,047	1,078,761.06	89.2	226.5	21.1
	1931	42	1,251,563	1,016,134.45	81.2	216.3	26.1
	1932	24	721,758	479,392.10	66.4	172.8	26.1
	1933	17	539,539	424,441.69	78.7	166.5	21.7
VI—Under 20,000	1930	53	572,737	436,453.16	76.2	181.6	10.1
	1931	50	553,001	423,899.67	76.7	199.8	10.1
	1932	26	262,357	216,196.47	82.4	186.9	10.1
	1933	19	233,064	157,052.87	67.4	189.6	23.4

* Exclusive of hospitalization, institutional care, medical relief, garbage collection and disposal and capital expenditures and deficits.

† Includes Board of Education expenditures, but not expenditures for physical education and health instruction by teachers.

TABLE II

NUMBER OF CITIES SUBMITTING SATISFACTORY DATA FOR TERMINAL YEARS OF PERIOD 1930–1933

Group	*Number of Cities Accepted 1930*	*Number of Original Cities Accepted 1933*
I—500,000 and over	9	7
II—250,000 to 500,000	16	8
III—100,000 to 250,000	26	14
IV— 50,000 to 100,000	28	12
V— 20,000 to 50,000	40	10
VI—Under 20,000	53	9

service in some places at least. Other information coming to the attention of the committee suggests that this was the actual condition of affairs.

Sixty cities entered in the contest filed satisfactory reports for the terminal years 1930 and 1933. The figures were analyzed for the purpose of determining possible changes in the amount of funds available for health services studied in connection with this report. The figures for the large cities are considered more significant than those for the smaller cities because more cities of the larger population groups enter the contest and more continue to submit data acceptable for analysis. Figures substantiating this point are given in Table II. For example, 7 of the 9 original contest cities in Group I also presented acceptable data for the year 1933, but the small number of original entries and return cities in the lower population groups renders the sample extremely unreliable for statistical analysis. This again emphasizes the difficulty which is always encountered in trying to obtain information on any large number of cities below 50,000 inhabitants, and to some extent the same statement is true of cities up to 100,000 inhabitants.

The expenditures of the 60 cities filing acceptable data for both 1930 and 1933 are shown in Table III. These figures include expenditures through official health agencies for services other than hospitalization, institutional care, medical relief, garbage collection and disposal, capital outlays and deficits. Expenditures by boards of education for medical and nursing services are included also, but not expenditures for physical education and health instruction. A very material decrease in appropriation was experienced in 1933 as compared with 1930. The percentage reduction varied from around 25 per cent in Groups I and II, to 10 per cent in Group IV. In the other three Groups—III, V, and VI— the percentage reductions were 17.3, 13.4, and 15.5, respectively. According to Table I, to which reference has already been made, 1931 seems to have been the peak year from the standpoint of expenditures for health by cities in Groups, I, II, and III. Consequently, if expenditures for 1933 had been compared with 1931, the percentage reductions might have been considerably more. In Group II, there appears to have been some selection of cities reporting low per capita expenditures for the terminal years; otherwise the cities included in Tables I and III seemed somewhat comparable. Direct comparisons, however, between the figures given in Tables I and III must be made with due caution because the same cities are not under consideration in each case. No reason can be given for what appears to be an excessive curtailment of expenditures in the large as compared with the smaller cities. It may be said in extenuation, however, that the larger cities perhaps were in better position to adjust themselves to reduced budgets by simply lessening the

TABLE III

A COMPARISON OF TOTAL AND PER CAPITA EXPENDITURES FOR HEALTH SERVICES * BY OFFICIAL AGENCIES † FOR THE TERMINAL YEARS 1930 AND 1933 (60 CITIES REPORTING)

Group	Year	Number of Cities Reporting	Population Represented	Total Expenditure	Per Capita (in Cents)	Decrease in Cents	Per Cent Decrease	Maximum City Per Capita (in Cents)	Minimum City Per Capita (in Cents)
I	1930	7	6,095,767	$5,568,776.17	91.4	....	....	118.0	36.3
	1933	7	6,095,767	4,172,197.46	68.4	23.0	25.2	117.1	41.5
II	1930	8	2,741,979	2,092,914.40	76.3	....	....	110.0	54.8
	1933	8	2,741,979	1,606,386.24	58.6	17.7	23.2	96.5	37.7
III	1930	14	1,987,530	1,865,050.71	93.8	....	....	170.4	42.4
	1933	14	1,987,530	1,541,977.83	77.6	16.2	17.3	158.4	21.1
IV	1930	12	830,128	670,707.55	80.8	....	....	147.6	32.8
	1933	12	830,128	598,277.05	72.1	8.7	10.8	144.7	35.2
V	1930	10	342,091	350,841.92	102.6	....	....	180.3	26.1
	1933	10	342,091	303,956.96	88.9	13.7	13.4	166.5	21.7
VI	1930	9	114,720	76,126.51	66.4	....	....	181.6	27.2
	1933	9	114,720	64,338.69	56.1	10.3	15.5	189.6	23.7

* Exclusive of hospitalization, institutional care, medical relief, garbage collection and disposal, and capital expenditures and deficits.

† Includes Board of Education expenditures, but not expenditures for physical education and health instruction by teachers.

service, whereas the same percentage reduction in budgets of smaller cities would mean wholesale dismissal of personnel including those holding key positions on the technical staff. On the other hand, it is a source of considerable discouragement to learn that the expenditures in cities of Group II have fallen to 58.6 cents per capita which is below the figure (59.01 cents)* reported for the largest cities in 1923. Thus the goal $2.00 per capita per annum recommended by the Committee on Administrative Practice appears to be receding, for the time being, at least.

SUMMARY

The Committee on Administrative Practice of the American Public Health Association as well as its precursor, the Committee on Municipal Health Department Practices, is deeply concerned in making available information relative to the status and practices of state and local health departments. Most of the data published so far are of the cross-section survey type assembled at intervals of from 5 to 10 years. Such surveys have furnished valuable information, and should be repeated as the occasion demands, but information less detailed in character should be kept current.

A special Sub-Committee on Current Practices of Health Departments was formed to study the types of data required for answering most inquiries and the feasibility of developing a national reporting system. Schedules assembled in connection with the Inter-Chamber City Health Conservation Contest were made available for study purposes. The Sub-Committee on Current Practices of Health Departments is of the opinion that information collected on an annual basis covering expenditures by purpose, and personnel by professional classification should furnish sufficient data for answering most of the inquiries and serve as a basis for estimating progress or retrogression. The collection of such data on a nation-wide basis should not involve any great difficulty or large expense if made a routine activity of the U. S. Public Health Service. Information on services is to be desired, but its collection and analysis does not seem feasible until clear-cut definitions for

* Municipal Health Department Practice for the Year 1923, *Public Health Bull.* 164, Government Printing Office, 1926.

specific services and standard methods of reporting can be established.

From a preliminary analysis of the data assembled through the contest for the years 1930, 1931, 1932, and 1933, it appears that appropriations were maintained through 1931; in 1932 some reduction occurred; but a drastic cut was made in 1933. Budgets are rapidly approaching those reported for 1923 in *Public Health Bulletin 164.*

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NOTE: Additional articles dealing with expenditures by functions and personnel according to major professional classifications will appear in subsequent issues of the *Journal.*

Lead Poisoning in Czechoslovakia

THE Czechoslovak Ministry of Social Welfare has recently circulated to the other departments a draft Bill for the purpose of excluding women and young persons under 18 from employment in certain processes in the treatment and handling of lead and zinc. The Bill also lays down certain conditions to be observed in regard to the employment of adult male workers in such processes:

The operations from which women and young persons under 18 are excluded are those enumerated in the Lead Poisoning (Women and Children) Recommendation, 1919, and the restrictions to be imposed relative to employment of adult male workers in these processes are those prescribed in the Recommendation for women and young persons where their employment is permitted in processes involving the use of lead compounds, with the addition of more detailed requirements as to the state of the workrooms, lighting and ventilation, methods of cleaning and protective clothing.

The Bill also provides for medical examination on engagement and rejection of the unfit.—*Indust. & Labour Inf.,* LIII, 5 (Feb. 4), 1935.

EDITORIAL SECTION

Expressions of opinion and statements of supposed facts are published on authority of the writer under whose name they appear, and are not to be regarded as expressing the views of the American Public Health Association, unless such statements or opinions have been adopted by vote of the Association.

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SHALL MARRIAGE COUNSELLING BECOME AN AMERICAN PUBLIC HEALTH FUNCTION?

BY marriage counselling we understand such advice by medically trained persons, and others with legal and social or psychological competence as is sought by men and women, unmarried or married, who believe that their lives together will be happier and wiser if they learn, before rather than after they have met conflict and suffering in marital sex relations, what medical and social experience has gathered and can legally impart to them. By the term "public health function" we refer to the authorized and tax-supported use of official health agencies under the police power of the states or under federal government, for the promotion of health, the prevention of sickness, and the postponement of death.

From Aroostook County, Me., to Los Angeles, Calif., physicians, nurses, and health officers are engaged in the preliminary experiences with their communities, with religious sects, and with appropriating bodies of local government in the matter of contraceptive advice.

There are now in operation in the United States, including Hawaii and Alaska, 157 marriage advice centers, of which 18 are controlled and served by the local public health authority. Twenty-six of the states have one or more of such centers, and in the case of 4 (Michigan 12, Pennsylvania 19, California 29, and New York 32), they are numerous and fairly distributed according to population. Thirty-five of these stations of medical and health information are in hospitals, the remainder being apart from any agency for the organized care of the sick.

Up to the end of 1934 not less than 200,000 women have sought and received advice at such centers, or 1 for each 100 women of childbearing age in the population. The ratio of marriage advice stations to population is one to each 400,000 in New York City.

The 3 stations in the rural area of Aroostook County, Me., established since August, 1934, with the approval and financial assistance of Town Managers and Selectmen, with the endorsement of the local medical profession, and associated with home visits by the district nurses, served 161 patients in the first 10 weeks.

The issuance of *Circular No. 1408,* May 31, 1934, by the Ministry of Health of Great Britain to Local Health Authorities, constitutes the latest episode in a history of progress in liberal social use of medical knowledge, beginning with the activities of the Malthusian League (1877–1914), and carrying on through the Women's Coöperative League (1923); the memorandum of the Ministry of Health (1924); Dame Janet Campbell's *Report on Maternal Mortality,* 1924; a resolution of the House of Lords favoring distribution of birth control advice among the masses (1926); approval by the Bishops of the Church of England of birth control (1930); the memorandum No. 153 M.C.W. by which the Ministry of Health allowed local health authorities to furnish birth control information to women attending local child and maternal welfare centers (July, 1930); and the *Final Report of the Departmental Committee on Maternal Mortality and Morbidity* (1932), which specifically recommends the giving of contraceptive advice to women on certain medical indications.

The latest circular (No. 1408) carries into effect by the option of the local health officer, and by public funds, the opinion of the Ministry of Health, that it is proper to offer contraceptive advice to married women suffering from illnesses which are detrimental to them as mothers, discretion as to what is or is not medically detrimental being left to the physician in charge of the clinic.

Careful, thorough, progressive, democratic, competent English leadership in the field of public health has in this matter included birth control information as an approved function of clinics devoted for many years past to practically all other phases of maternal and child health guidance.

In Germany, first in 1905, in voluntary agencies, and later in health offices, schools, hospitals, and churches, marriage counselling has been undertaken by the coöperative skill and training of physicians, lawyers, and persons with social and psychological training.

Evidence of the socially eugenic effect of the educational and technical service offered at the marriage advice bureaus of Germany, appears in the changes in the birth rates of 4 economic classes, for instance in Bremen, from which city the following data are obtained:

	Birth Rate per 1,000		
	1901	*1925*	*Per Cent Change*
Among families of the well-to-do	12.7	14.7	+15
Among families of the middle class	28.9	14.2	—51
Among families of laborers	43.7	19.5	—53
Among families of the poor	46.2	18.9	—60

It would appear that the less competent but usually more prolific fraction of the population reduces its birth rate more than do the economically more favored groups. Similarly in France where contraceptive information has long been generally available, without legal sanction, there is a tendency of birth rates among all classes to approach equality.

	1906	*1930*	*Per Cent Change*
Birth rate among well-to-do in France	12.3	16.3	+32.5
Birth rate among the poor in France	22.9	16.6	—28.3

With a marriage rate in the United States today of about 8 per 1,000, with 1 in 6 marriages ending in divorce, with at least 1 abortion for each 3 pregnancies, with 15,000 maternal deaths a year from criminal abortion, and a large amount of maternal mortality related to conditions in one or both parents of a preventable character, and with disproportionally high birth rates among the less competent

part of our population, we may well consider whether there are not lessons for us to learn and apply in the example of some European nations which, like England, Germany, Holland and the Scandinavian countries, have incorporated the protection of women against pregnancy by appropriate medical advice in their public health services.

Federal laws of the United States today forbid transmission of contraceptive information through the mail, even the addresses of marriage advice stations, or transportation of supplies for contraceptive purposes by express companies or other common carriers, or possession of articles intended for contraceptive purposes. The archaic laws of 1873 include contraceptive advice under the head of obscenity. Federal laws conflict with the state laws. Physicians legally giving contraceptive advice in a state have to bootleg supplies and educational material for their patients or go without. Commercial exploitation of fraudulent materials and measures is widespread.

The bugaboo of religious intolerance of medical advice for contraceptive purposes can no longer be honestly quoted in the face of publicly declared positions of a number of important organizations * which have expressed a favorable attitude toward the dissemination of birth control information under appropriate conditions.

It would appear that the public health profession in the United States has not only an opportunity but an obligation to make available through prenatal conferences, in maternity and baby and child health centers and through appropriate educational channels, under strictly medical control, such advice and guidance, including the teaching of safe and effective methods of contraception, as will preserve the physical and mental health of the family and in particular of the mother of living children. If there were no other good reason for the educational service of a marriage advice bureau, the necessity of warning women against the mechanical and chemical damage of many of the exploited and untrustworthy contraceptive devices should suffice.

The medical profession and the officers of health throughout the nation should be relieved of personal and official embarrassment in meeting their professional obligations, by repeal of much or all of the existing prohibitory federal and state laws affecting the giving of contraceptive advice, which at present are either disregarded or remain in disrepute and contribute to dishonesty, confusion of conduct, and commercial fraud.

Contraceptive clinics and marriage advice bureaus will doubtless continue to increase in number and patronage. It would be wiser to direct the demand toward professionally competent official agencies than to permit expansion and exploitation through those less qualified.

For authentic sources of information in this field the following brief list of references is offered:

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* The Universalist General Convention, 1929; the Central Council of American Rabbis, 1929; the Lambeth Conference of Bishops of the Church of England, 1930; the Federal Council of Churches of Christ in America, 1931; the General Council of Congregational and Christian Churches, 1931; the New York East Conference of the Methodist Episcopal Church, 1931; the Philadelphia Yearly Meeting of Friends, 1931; the Y.W.C.A. National Board, 1934.

LETTER FROM GREAT BRITAIN

THE RETURN OF PROSPERITY

The press here for some time has been announcing that trade and everything else is better, and the fact that the income tax was reduced may be taken as evidence. More definite evidence has been the prodigality in entertainments during the later months of 1934, and the extraordinary density of the shower of greeting cards and gifts that fell upon practically everyone round about Christmas time.

So far as entertainments were concerned, even members of the public health service were affected. The annual dinner of the Society of Medical Officers of Health itself, for example, appeared more lavish than usual, if in nothing else in the matter of speeches at any rate. To an extent this was because the occasion was chosen for having certain members as guests of honor, on account of the value of the services rendered to the society, its members, and the health service generally. Prominent among these guests was Dr. George F. Buchan, well known to public health workers in the United States as an Honorary Fellow of the American Public Health Association and for other reasons. The toast of the guests of honor was proposed by Sir John Robertson, Professor of Public Health in the University of Birmingham and formerly Medical Officer of Health of that city.

On the evening following the dinner there was a reception to, among others, representatives of the Society of Medical Officers of Health at the Hall of the Society of Apothecaries. This was something in the nature of an event and a very great honor, and was accorded largely because the Master of the Society of Apothecaries is Sir George Buchanan, until recently Senior Medical Officer at the Ministry of Health.

The Society of Apothecaries is one of the City of London Companies, being an off-shoot of the Grocers' Company, one of the most ancient, wealthy, and prominent of these institutions. Practically all of these companies concern themselves with education in some shape or form. The Grocers' Company, for example, has endowed a school for boys, and annually grants a number of scholarships for medical research. The Apothecaries Company is, naturally, interested in medical education, and in addition to granting qualifications to practise medicine, following examination, also examines candidates for and grants special qualifications in obstetrics and gynecology. The Hall of the Society is one of the old buildings of the City and includes a number of interesting apartments in addition to the beautiful Hall itself, which is used for, among other purposes, banquets—invitations to which are greatly valued—receptions and so on. The Society possesses many pictures and much furniture, plate, and relics of great intrinsic value and immense historical interest. Also they have a very fine cellar and recipes for special beverages dispensed on important occasions such as this of which I write, when Sir George Buchanan, supported by his "wardens," Sir William Willcox, the well known medical jurist, and Dr. Fairbairn, Chairman of the Central Midwives Board, received members of the public health service as guests.

PUBLIC HEALTH REPORTS

With the appearance of Sir George Newman's *Report on the Health of the*

School Child, early in December, was completed the series of government health reports for the year 1933, in which health officers are particularly interested. The others are, of course, the report of the Ministry of Health, which always comes first, and the report *On the State of the Public Health*, which is Sir George Newman's report as Chief Medical Officer of the Ministry of Health. In *The Health of the School Child*, he reports as Chief Medical Officer of the Board of Education, the first government post, by the way, to which he was appointed. The report of the Ministry of Health covers a review of the whole field of work operated by the department, the subjects dealt with falling under the main heads of Public Health, Housing and Town Planning, Local Government and Local Finance, Poor Law, National Health Insurance and Contributory Pensions. It is no doubt because the matters to be discussed are so numerous and so diverse that the Chief Medical Officer of the Ministry makes an individual report which appears as a separate volume. In regard to public health, the report shows that the activities in relation to sanitary matters and the health services generally throughout the country were well maintained.

HOUSING, TUBERCULOSIS, ETC.

Water supply was troublesome in certain parts on account of the drought, but by means of increased loans, amounting in all to over three millions sterling, the Ministry sought to help authorities making provision of supplies. A note in regard to the special survey of health services now in progress shows the Minister of Health satisfied with the provision made by the local authorities. Similarly satisfaction is registered following the review of the work done during the year in relation to the working of particular welfare or disease prevention schemes and so on. Provision for dealing with tuberculosis continues to grow, and very full use is made of the various sanatoria and other institutions provided by local authorities and otherwise. Special mention is made of the work done at Papworth and other village settlements.

In relation to maternity and child welfare also the work of local authorities continues to develop steadily. The infantile mortality rate for the year was 64, the rate of maternal mortality being 4.32 (1.75 for deaths from puerperal sepsis, and 2.57 for deaths from other causes). The total rate in 1932 was 4.04, and in 1931, 3.94. In relation to housing, slum clearance and the provision of new houses are shown to be progressing actively. Exclusive of houses built for re-housing purposes in connection with slum clearance, over half a million were built in 1933–1934. The total annual contribution from public funds to housing is shown to be about 16½ millions sterling.

NATIONAL HEALTH INSURANCE

Poor law and national health insurance work received close attention during the year. In 1933–1934 the average numbers of persons in receipt of institutional and domiciliary poor relief were respectively 185,457 and 1,139,546, a total of 1,325,003, representing 330 per 10,000 of the population. For assistance to distressed areas throughout the country, a special grant of ½ million pounds was voted by Parliament. As indicating the extent of the insurance medical services in England alone in 1933, it is noted that 15,500 doctors were in insurance practice; that medicines, etc., were supplied as part of medical benefit at about 10,200 chemists' shops, and that the number of insured persons entitled to medical benefit was approximately 15,150,000. The cost of medical benefit was just under 8½ millions sterling, of which over 6 millions went to pay insurance

doctors for their services — services which, though it is not in terms stated in the report were greatly appreciated, were of the greatest advantage to the great part of the insured population, and resulted in many cases in securing medical assistance that, in the absence of the scheme, would have lacked it. In his own report (*On the State of the Public Health*), Sir George Newman devotes a section to the insurance medical service, and though he makes no sounding claims as to its excellence, stresses the fact that complaints against doctors are year by year very few; numbering in 1933 no more than 203.

EFFECTS OF UNEMPLOYMENT

In other sections Sir George discusses the situation in relation to such matters as epidemiology generally, tuberculosis, maternity and child welfare, cancer, and so on. Sociological questions also, as usual, receive a great deal of attention, and as he was almost compelled to do so he has much to say on unemployment and the economic depression and their effect on the health of the nation generally. Always his view has been that, in spite of the adverse conditions in regard to employment, the state of the public health and nutrition cannot be shown to have been affected in any degree. This opinion he reiterates and backs with statistics and the evidence of medical officers of health and others in particular areas. In his report as Chief Medical Officer of the Board of Education (*The Health of the School Child*), he refers again, as follows, to the subject:

> The indisputable evidence of the national morbidity and mortality rates, of the health insurance returns, and of the school medical service for 1933 indicates quite definitely that the general health and nutrition of the population of England and Wales, taken as a whole, was well maintained in 1933, in spite of economic and social difficulties, distressing as these have been. . . . There can be no question that the nutrition of the English people is better today than at any past period of which we have record. . . . From the returns of the local education authorities for 1933 it is evident that whilst some schools find undernourishment is present, and has even increased in certain areas or particular groups of school children, it is not generally more prevalent than in recent years, in spite of the economic depression and the mental distress and hardship following in its train. This circumstance is due to the increased care and devotion of the mothers and teachers, to manifold forms of voluntary service, and to the public provision of insurance benefit, school feeding and medical supervision.

Sir George Newman's reports are always scholarly and readable. He writes with conviction, and because it is not always merely as an official setting forth facts and information with regard to which there can be neither question nor dispute, or as a scientist that he writes, but as a humanitarian and a sociologist as well, there is never the feeling that it is with so many figures of people or school children he is dealing, but with living beings who have had a past that may not have been too happy and healthy, and are having a present and will have a future that he is trying to insure shall be better and happier and healthier. In both the school and the general report for 1933 there are many sections in which these things are shown, and I wish very much I might have been able to do more than merely refer to the fact of the existence of the volumes.

CHARLES PORTER, M.D.

London

PUBLIC HEALTH EDUCATION*

Dates Ahead—In March, 1877, a "visiting nurse first started her rounds to sick poor"; St. Patrick, "credited with driving the poisonous reptiles out of Ireland," whose birthday may be applied to the medicine fakirs of today; National Negro Health Week opens in March, 1935.

April Fool's day offers a lead against fakirs and superstitions; the first dispensary opened in April, 1786; National Youth Week closes April in 1935, and leads into Child Health Day.

The above are samples of dates to be used to give timeliness to health publicity. Additional information and dates running throughout 1935 are to be found in "News Almanac for Social Work—1935," edited by Louise Franklin Bache who had charge of health education in the Health Department during the Syracuse Health Demonstration. Of course there are many dates and ideas for nearly all forms of social work, but a goodly proportion may be utilized by health agencies.

Single copies, *50 cents*. Address: Community Chests and Councils, 155 East 44th St., New York, N. Y.

Write to Dr. R. C. Brown, U. S. Public Health Service, Washington, D. C., about Negro Health Week; National Youth Week Committee, 211 W. Wacker Drive, Chicago, Ill.; American Child Health Assn., 50 W. 50th St., New York, N. Y., about National Child Health Day.

Testimony from the Advertisers—Last year there were vociferous applauders of the purity of food and patent medicine advertising and manufacture. But in recent months the full and complete answer could be gleaned from extracts from articles in advertising journals and reports of advertising conventions. When talking among themselves there has been abundant testimony during the fall and winter to the need of legislative control, unless we accept the optimistic view that industry can and will do a thorough cleaning up job.

For information about present and proposed food and drug laws address U. S. Food and Drug Administration, Washington, D. C.

The Red Cross Is Criticised—In *American Mercury*, Nov., 1934, appeared a scathing criticism of the American Red Cross. The extreme insinuations were such as to raise doubts in the mind of a thoughtful reader, but many supposedly factual statements had an appearance of accuracy.

Doubtless the Red Cross, as a very human institution, is imperfect and inefficient here and there. ***But the most striking criticisms in the Mercury article are characterized by the Red Cross as gross misstatements of fact or of interpretation.***

A brief criticism, signed by Paul U. Kellogg, appeared in *Survey Midmonthly* (112 East 19th St., New York, N. Y.), Dec. 15, 1934. A more complete answer is *Red Cross Operations*, a pamphlet issued by the American National Red Cross, Washington, D. C. Copy *free*.

Because of the public health activities of the Red Cross, public health

* Please address questions, samples of printed matter, criticism of anything which appears herein, etc., to Evart G. Routzahn, 130 East 22d St., New York, N. Y.

workers will wish to know the truth about this magazine article.

The Need for Economic Security—Twelve silhouette charts tell the story in "The Need for Economic Security," a publication of the Committee on Economic Security, Washington. "The annual accident toll" and "Illness among persons in families of varying economic status" directly concern our readers, but most of the diagrams have striking implications for those interested in medical services and the economic factors affecting the health of individuals.

Here is material for lantern slides, for bulletin boards, for reproduction in house organs, as illustrations for newspaper stories, for large scale platform illustration, as the basis for staff and outside group discussion. And they illustrate how much statistical material may be made graphic.

Address: Committee on Economic Security, Washington, D. C. Copies *free*.

Health Education in January Journal—In *American Journal of Public Health*, Jan., 1935, appeared the following in "Reduction of Maternal and Infant Mortality in Rural Districts":

> One of the important functions of a health officer, who is determined to lower the maternal and infant mortality rates in a rural area, is to develop active and efficient lay support of his undertakings. His personality and his ability to interest the public in his child health program may determine his success or failure in this field. This matter of organizing groups of influential citizens to further a community program in behalf of mothers and infants should be given more emphasis in our schools of public health in addition to the many technical and scientific subjects the embryo health officer is expected to master. (Followed by discussion of the organization of interested lay groups.)

Under "The Ninth Pan-American Sanitary Conference" it was stated that

> In connection with venereal disease educational measures were advocated . . . and especially the necessity for greatly increased popular health education was discussed.

But most important of all was the editorial, "Medical and Scientific English," on page 85. That editorial, we hope, will be re-read by all who see this paragraph.

The editorial could be used in a number of ways to contribute toward better health education.

Why not reprint most of it in every national and state journal and bulletin?

Why not supply mimeographed or printed copies to all staff members who talk or write or handle correspondence, and to all who write for any of our periodicals?

People Do Read—The American Library Association reports a decrease in the reading of fiction, with continued popularity of books on economics, political and social sciences, among others, as well as a steady interest in success books and occupational works. Could we increase the reading of books on health, the human body and its physical environment by making more of the success phase of health? "Fiction Reading Decreases" (*Publishers' Weekly*, 62 West 45th St., New York, N. Y., Jan. 5, 1935), and "Who Reads What—and Why" (*Nation*, 20 Vesey St., New York, N. Y., Jan. 23, 1935) give some of the facts about readers and reading.

A Newspaper Campaign Reduces Accidents—San Francisco reports success in contrast with the Los Angeles testimony of failure (see this department for Jan., 1935, page 93) in crusading against auto accidents.

Editor and Publisher reports the campaign conducted through 1934 by the *San Francisco News*, crediting it with

> . . . a fatality decrease in San Francisco of 14.5 per cent over 1933, while California

and the country as a whole registered an increase of 15-plus per cent. Oakland, across San Francisco Bay, the nearest neighboring city, registered an increase of 38 per cent. The Los Angeles auto death rate per 100,000 population was almost twice that of San Francisco.

These definite results have inspired the *San Francisco News* to plan a continuous campaign during 1935 that will be even more effective.

The plan for 1934 called for "at least one story on safety every day." Actually,

. . . the result was an average of from two to three stories a day, besides scores of illustrations, editorials and cartoons during the year.

For some of the details see *Editor and Publisher,* Times Bldg., New York, N. Y. Feb. 2, 1935. *10 cents.*

It Never Was Stopped—The December, 1934, issue carried this paragraph:

The *Monthly Bulletin,* Indiana Division of Public Health, Indianapolis, has been revived under the editorship of Thurman B. Rice.

It never has stopped publication. It merely failed to reach this editor for a period of months. This illustrates how easy it is to misstate the facts without a direct check-up.

A Housing Exhibit for Your City—An unusual Housing Exhibit was shown recently at the Museum of Modern Art, New York City. This display, presented in modernistic fashion, deals with the broad aspects of housing. It is available for other communities. Address Lyman Paine, New York City Housing Authority, 10 East 40th St., New York. Early application is desirable to avoid conflicting dates.

Joint Health Education in New York City—The bigness of New York City seems appalling when a community health education effort is being planned. But the Welfare Council, through its Health Education Section, has undertaken to focus the activities of health agencies upon a series of monthly topics making each educational effort go further through combining forces. No extra funds will be available, as were expended in the diphtheria campaign, and efforts must be avoided which might lead to new demands upon clinics or nursing services.

The 1935 topics will be as follows:

February—Congenital syphilis; *March*—Heart diseases, Diphtheria and communicable diseases; *April*—Early treatment of tuberculosis; *May*—Maternal and child health, Dental and oral hygiene; *June*—Nutrition, Summer care of children; *July*—Safety and accident prevention.

In the Great Smoky Mountains—"Thoughts on Nutrition and Health in the Mountains," after describing conditions says:

The problem of diet in the mountains is partly economic but not wholly so, for we sometimes observe people in good condition so far as economic status is concerned, who do not have proper diet. I feel convinced that the real solution of this health problem is to be found in education. . . . But it will require the coöperative efforts of doctors, public health nurses, vocational agriculture and home economics teachers, county agents, home demonstration agents, and others, for a long time, to carry through this program of education.

By Dr. R. F. Thomas. *Mountain Life and Work,* Berea, Ky. Jan., 1935. *30 cents.*

Health Education in India—In the annual report of the Bombay Branch of the Baby and Health Week Assn., Bombay, India, we find a picture of "a stall in the Foods and Vitamins Exhibition arranged at Byramjee Jeejeebhoy Home of the Society for the Protection of Children in Western India, at Matunga." There is described a "scheme of health propaganda" submitted to the Director of Public Health and the Surgeon General, at Poona.

Free cinema shows, lectures with magic lantern slides, and the exhibition of models showing by contrast measures that improve the condition of the villager and those that are lowering it at present are the chief items with which my association has carried on propaganda for the last 8 years with remarkable success. Such demonstrations have necessarily to be followed by some permanent measure for his relief such as the improvement of village water supply, removal of dirt from the village, training of Dais and their supervision, etc. But the Exhibitions and Cinema Shows help the welfare worker a great deal in dispelling superstitions and securing the voluntary coöperation of the villagers.

Preparation for Better Service—In February a 1-week institute for tuberculosis workers was held by Massachusetts Tuberculosis League in Boston, with Philip P. Jacobs in charge. Prof. C. E. Turner presented adult health education and school health education.

An Institute for Tuberculosis Workers is being held in the first 2 weeks of March, 1935, by National Tuberculosis Assn., and New York University, with Philip P. Jacobs, Ph.D., conductor. Several sessions will be devoted to adult and child health education.

Home Hygiene Instructors' Institutes will be held in a number of states by the American Red Cross. The Home Hygiene Service conducted 26 Institutes in 1932–1933, and 45 in 1933–1934.

"Dental Health Education," by J. M. Wisan, D.D.S. Describes an extension course for teachers and nurses conducted by Newark, N. J., State Normal School. *Child Health Bulletin*, American Child Health Assn., 50 W. 50th St., New York, N. Y. Jan., 1935.

Calgary, Uganda, and India Prize Winners—Annually the National Baby Week Council, London, England, makes a series of awards for the best Baby Week Campaigns held in British Empire outside of Great Britain.

First prize in 1933–1934 went to the Calgary (Canada) Council on Child and Family Welfare.

Second place went to Kampala, Uganda, for

. . . an extremely good campaign, which followed very much the same lines as those adopted for such campaigns in this country (England), though it was adapted with great skill to meet the problems presented by a native and often illiterate people. A wonderful baby show was held during the Week, for which 72 African babies and 100 Asiatic babies were entered, and a particularly forceful event in the programme was the Infant Welfare and Public Health Exhibition, which attracted more than 75,000 people.

The third award went to Mysore, India, with additional awards to points in India, Ceylon and Africa.

For additional information see *Mother and Child*, 5, Tavistock Square, London, W.C.1. Sept., 1934. *9d.*

Hygeia for February, 1935—Material for speakers and writers and for reference, in *Hygeia*, 535 N. Dearborn St., Chicago, Ill. (*free copy* to health workers):

New food and drugs legislation. Undulant fever—then and now (with good picture diagram on pasteurization). A heart-to-heart talk about hearts (a radio talk). Preventable diseases in the Washington family (history for popularization). The challenge of the slums (new housing possibilities). Science and health and the key to the crime wave (cartoon by Ding). Experimentation and medicine: man's debt to the animal world. Occupational diseases of musicians (more of them). "Occupational diseases" of children (a second lot). Health education in Arizona (a project already 7,000 miles long). The clothes moth (the 9th parasite). The golden age of prevention (about teeth). The eyes in infancy and childhood. Exploding a sinus fallacy. Old Boston school days (more usable history). The A.M.A. and tomato juice. New books on health. Questions.

For teachers and others: Healthy children—the teachers goal. The report card comes home (mental hygiene). Enjoying trips to the dentist (*a story of genuine achievement*). Fruit goes up a point (in a high school lunch room). New health books for teachers and pupils.

A.M.A. radio programs, too late for listing

here, but announced for NBC network on Tuesday at 5 p.m., E.S.T., and Columbia network, Thursday at 4:30 p.m., C.S.T.

Learning on the Job—A number of round tables have been offered by the New York Social Work Publicity Council for these groups:

Those who wish to learn about methods and materials

Those who have specific questions or special needs

Those who wish to think out and talk over technic or principles and philosophies

Wherever two or more health workers may get together to talk over such topics as are offered in New York, it is likely that health education will benefit. Also, there is a widening of experience and information where the health workers may join with workers in other social welfare fields.

One of the simplest and most effective means for learning on the job is to talk over and think out with others the basic technics.

The Social Work Publicity Council will be glad to share ideas and outlines with anyone who will get together with at least one other person to discuss any of the topics which follow.

Amateur movies: What practicable values do amateur movies offer to social agencies in or near New York City? how inexpensive they are? how to get them?

Annual reports: The uses of annual reports and how to fit them to those uses.

Broadcasting: The philosophy of health and welfare broadcasting, and its practical application, including the critical examination of proposed plans and materials.

Health education for adults: An exploratory group: What *is* health education? What are the particular problems in conducting effective health education in New York City?

Making ideas and statistics graphic: On making reports, plans, statistics, etc., interesting and clear to board members, committee meetings, general audiences, and in publications.

Meetings: The reduction of meeting or conference overhead of social worker groups; the improvement of quality and value. If this year you will arrange or lead or speak at or attend even a single meeting, small or large, this group will serve you.

Mimeograph and other duplicating processes: About more and better use of duplicated material, and better duplication.

Newspaper releases: ***Limited*** to those who will submit releases for friendly comment and constructive criticism by the group and the guest clinician.

Photography in social work: How we may get better service from professional photographers; where the amateur may serve; new types of photographs "instead of the same old stuff."

Printed matter clinic: Samples of printed matter or of copy for printed matter will be submitted for friendly criticism by the group and by invited clinicians. ***Limited*** to those who will submit samples for review.

Statistical data for publicity use: Kinds of data having publicity value; what annual or quarterly statistics can be used to advantage; what general or governmental data may be of value; collecting data primarily for publicity; channels for use.

Volunteers in publicity; To explore the practical possibilities in publicity service of various types by volunteers. Open to volunteers, executives, publicity workers.

Window displays and other exhibits: Planning and preparation of window displays and other exhibits; to include consultation sessions with a display man, photographer, etc.

For copy of the full list with other details send 3 cents postage to Social Work Publicity Council, 130 East 22d St., New York, N. Y.

Wanted for Awards—Descriptions of successful projects in health education will be considered by the Awards Committee of the Social Work Publicity Council, 130 E. 22d St., New York, N. Y., in making selections for the annual citations for merit. These must be received before April 1.

Wanted for Milwaukee—What ideas have you for development at Health Education and Publicity Headquarters? What display could you set up? What display idea would you illustrate?

Early collaboration will add interest and value to the center at the A.P.H.A. meeting for those concerned with health education.

Wanted for the JOURNAL—We are sure that much good and useful health education material issued by local, state, and national health agencies does not reach this department of the JOURNAL.

Will the health officer or the association executive or the supervisor of health education, or whoever is in authority, please designate some member of the staff to be responsible for sending copies of material already issued in 1934–1935, also new material issued during the remainder of 1935?

Wanted by the Editor—Have you prepared an amateur movie on health education? Have you used marionettes or puppets?

EXHIBITS

The Southern Medical Association gave an award to Texas Dept. of Health for its exhibit of Texas malaria control. The exhibit was almost wholly of well labeled objects.

"A Hospital Stages Its Own Historical Exhibit" describes an exhibit put on by St. Peter's Hospital, New Brunswick, N. J. Hospitals will wish to look up the details in *Trained Nurse*, 468 4th Ave., New York, N. Y. Feb., 1934. *35 cents.*

Baltimore Health Dept. recently exhibited The Big Bad Wolf—Diphtheria. —illustrated in *Baltimore Health News*, Oct., 1934,

"We built our house of straw" (house down and out): "No Toxoid Prevention—Thought it was just a sore throat—and didn't call a doctor—*Diphtheria.*"

"We built our house of sticks" (and showed it): "No Toxoid Prevention—Called the doctor too late—*Diphtheria.*"

"We did not dare take a chance. We built our house of bricks" (and it shows): "Toxoid Prevention—Given each child 6 months of age."

The Health Service of Howard University, Washington, D.C., conducted an exhibit on cancer. Among more conventional features were the following as reported by Dr. E. H. Allen:

Our Art Department painted a large caption "This individual is on his way to the physician to get intelligent information concerning cancer." I constructed in a cut-out below this caption a Mickey Mouse on a cardboard back in the act of hurrying somewhere in business-like manner. It was my original idea to use a jumping jack for the purpose of portraying continual motion, but I was unable to secure one at the time. A note of levity was hereby included which I think to be of some value. I also used the suggestion of a mirror with an attractive caption "This individual should have intelligent information concerning cancer." It worked.

Wisconsin Anti-Tuberculosis Association had a traveling exhibit as a feature of its Silver Jubilee. More than 44,000 saw the exhibit in 11 cities. The story is told of how 5 members of 2 families were placed in a sanatorium because 2 children from different families visited the exhibit in one city. The exhibit was

. . . a revival; a Spring Health Festival in which the truth about how to live to prevent and cure tuberculosis was brought freshly to some and reiterated to others.

The Dept. of Health Education for Boys of Seward Park High School, New York City, conducted a health exhibit as a teaching project:

The exhibits selected were practical. They applied to the everyday life of the adolescent, and were somewhat different from that generally presented as part of the course in hygiene.

The material was arranged to appeal to seasonal interests and to stimulate curiosity in games, skills, and practices partly or wholly unknown to the pupils before this exhibit.

Among the units displayed were: Sunburn, Posture, Poison Ivy, Care of feet, Poisonous toadstools and edible mushrooms, Hornets, Snakes, Dental exhibit, First aid and resuscitation, Camping, Milk and nutrition, Medical examination, Safety.

REPORTING

"When a Community Desires Health," a good line, is the title of

Detroit's Department of Health report for 1933.

The Township Board of Health, Maplewood, N. J., has used the mimeograph quite successfully in producing a 10 page report, 5½" by 8½".

Again the New York City Department of Health reported Jan. 1, 1935, on the city's health record in the year before, including numerous comparative tables of death rates for 5 years. 13 legal size mimeographed sheets.

The original health exhibit street car; the "Health Gypsy" who last year visited 315 schools and other groups; "Gypsy Gay" and "Professor Health," radio health talkers, are the more unconventional features mentioned in "Thirty Years of Tuberculosis Work in St. Louis." This reports on Tuberculosis and Health Society, 613 Locust St., St. Louis, Mo.

"Their Health Is Your Health" (quotation from Alfred E. Smith) is the title of a money raising report of Henry Street Visiting Nurse Service. Including self-cover, 16 pages; lower case side heads in blue; both illustrations and statistics presented in Neurath symbol pictures done by Pictorial Statistics, Inc., simple pictorial district map on the cover. The whole effect to be seen to be appreciated. 99 Park Ave., New York, N. Y.

TO DO OR NOT TO DO

Is not 10 better than ten, or 1,000 better than one thousand, when we are writing copy and really wish the mind as well as the eye to recognize our important facts?

"Lantern Slides," by S. Schaffer. *Safety Education*, 1 Park Ave., New York, N. Y. Dec., 1934. *20 cents.* Describes several methods for producing slides—on other subjects as well as safety.

Something for health workers to be on the watch for is reported in *Bulletin* of American Hospital Assn.:

> The Anti-Vivisectionists, with ample funds at their disposal and with the support of powerful newspapers, are conducting an energetic campaign in 32 states, and are organized, as they publicly announce, to carry their fight to the finish. Model bills against vivisection will be introduced in 32 state legislatures at the coming sessions.
>
> The enactment of these laws would be highly inimical to medical research. It would impede medical progress and hamper medical education. To prohibit animal experimentation would destroy the processes that have yielded many discoveries that have contributed to the prolonging and saving of the lives of many millions of our fellow-beings, particularly of our children.

Several articles have been written for those who are interested in the educational possibilities of the picture symbol as devised by Dr. Neurath. "The Neurath Pictorial Statistics," by M. E. Schwarzman, is accompanied by illustrations, and several reading references. *Progressive Education*, Washington, D.C. March, 1934. *50 cents.* "Statistics for All," same author. *Educational Screen*, Chicago, Ill. Sept., 1933. *25 cents.*

The seventh Gorgas Essay Contest is announced by Gorgas Memorial Institute, 1835 Eye St., N.W., Washington, D.C. Open to high school students; closes Feb. 15, 1935; with local, state, and national prizes. The committee seems to blunt the contest as an educational tool by offering a group of topics for the essay writers, rather than to seek widespread concentration on a single idea:

> The conquest of yellow fever in Havana. Gorgas' work in Panama as a factor in building the Panama Canal. Gorgas as Surgeon General during the World War. The bearing of Gorgas' work on the health problems of today. Importance of the Periodic Health Examination during the World War and as a health measure today. Insect-borne diseases and present status of their control.

SCHOOL HEALTH EDUCATION

"Health Education in a Rural County," by R. E. Grout. Especially the part of school nurses in Cattaraugus

County. *Public Health Nursing,* 50 W. 50th St., New York, N. Y. Sept., 1934. *35 cents.*

"Health Education in the State Normal School at Towson, Md.," by Spencer and Dowell. A school health monograph. Includes extensive reading references, without mention of prices. Metropolitan Life Insurance Co., New York, N. Y. *Free.*

"A Project in Rural School Health Education: Relationship with Community Health Programs," by Ruth E. Grout. *Quarterly,* Milbank Memorial Fund, 40 Wall St., New York, N. Y. Jan., 1935. Fourth in a series by director of health education study in Cattaraugus County.

"Health Education: The Review Lesson," by H. L. Conrad. Eighth in a series. *Mind and Body,* New Ulm, Minn. Dec.–Jan., 1935. *25 cents.*

A "School Health Guide" comes from County Health Officer, El Centro, Calif. Mimeographed; 31 letter size pages. Health service; health education; health information.

MAGAZINE ARTICLES

"A New Deal in Dietetics," by Mary P. Huddleston, editor of *Journal of American Dietetic Assn.,* in *New York Herald-Tribune Magazine.* Dec. 9, 1934.

> Today's nutrition points the way to buoyant youth, high adult vitality and longer life. A diet already adequate can probably be enhanced by added amounts of protective foods to insure positive and glowing health as well as protection against disease. . . . We may well believe that the dietary millenium has dawned. . . . Irradiated foods in general seem to be the latest word in dietetics.

"Saints, Witches and Babies," by Louise Summers. Health conditions among Mexicans in Arizona; "but a little understanding of the Mexican temperament and the Mexican background (and it is in this article) would at least throw some light onto the subject." *Junior League Magazine,* 305 Park Ave., New York, N. Y. Feb., 1935. *30 cents.*

FOR USE OR REFERENCE

"Good Posture in the Little Child," a poster based upon the pamphlet of same title. U. S. Children's Bureau, Washington, D. C. Both are *free.*

Historical material on diet and eating habits in "Vegetables in the Diet: Yesterday," by S. L. Smith (To be followed by "Today" and "Tomorrow.") *Journal of Home Economics,* 101 East 20th St., Baltimore, Md., *30 cents.* Later the series will be reprinted for *15 cents.*

In her syndicated column, released Dec. 16, 1934, Mrs. Roosevelt expressed an appreciation of the U. S. Public Health Service and told something about its history and present activities.

"Introducing Mr. Public Health," *Iowa Public Health Bulletin,* State Dept. of Health, Des Moines. Oct.–Dec., 1934. A public health study outline in 6 lessons intended for members of Congress of Parents and Teachers, Women's Division of Farm Bureau Federation, Federated Women's Clubs, etc. Covers the field but fails to focus attention upon adult health education.

A new set of 5 posters, "Healthy Childhood," has been issued by National Council for Maternity and Child Welfare, 117, Piccadilly, London, W. I. The text is limited to three or four words, such as:

Rest and sleep; The right food; Nature's food is best.

"Our Attitude Towards Cancer 'Cures,'" *Bulletin,* American Society for Control of Cancer, 1250 6th Ave., New York, N. Y. Jan., 1935. *10 cents.* Why "cures" are tolerated; need for testing station.

Public Health Reviews, is an 8 page monthly issued by Division of Hygiene and Public Health, University of Michigan, Ann Arbor. Includes summaries

of current books, selected articles and pamphlets. *Free.*

"The Social Adjustment of the Tuberculous," by B. W. Burhoe. National Tuberculosis Assn., 50 W. 50th St., New York, N. Y. *50 cents.*

"Social Hygiene and Family Case Work," is a set of charts "of special interest to nurses, medical social workers, and others interested in family health and welfare." How syphilis spreads, case finding, pregnancy, etc. Miniature sets, letter size, *10 cents* (quantity rates); 17×22 inches, $1.00; colored and mounted, $5.00. American Social Hygiene Assn., 50 W. 50th St., New York, N. Y.

"That Mean Cold" is an old title but a brand new booklet. Simple cuts, small pages, a sub-title on nearly every page, well leaded type—all contributing to easy reading. 11 pages and cover. John Hancock Mutual Life Insurance Co., Boston, Mass. *Free.*

That "Measles Threatens" we are reminded under that title which brings out the measles cycle as shown by New York morbidity statistics. *American Journal of Nursing,* 50 W. 50th St., New York, N. Y. Feb., 1935. *35 cents.*

"When the Unexpected Happens" is a first aid manual. A very clear table of contents; black face side heads; additional sub-headings centered on pages; simple illustrations with descriptive captions. One wishes that a little larger type could have been used to make easier reading when the user is excited by an emergency. 30 pages. John Hancock Mutual Life Insurance Co., Boston, Mass. *Free.*

BOOKS AND REPORTS

Amebiasis and Amebic Dysentery—*By Charles F. Craig, M.D. Springfield, Ill.: Thomas,* 1934. 315 pp. 54 ill. Price, $5.00.

The epidemic of amebic dysentery in Chicago in 1933 emphasized the deplorable lack of knowledge of amebiasis and amebic dysentery by the medical profession and laboratory workers in this country, and created an insistent demand for an authoritative treatise which would be of practical value as a reference book. This demand has been met in an exceptional manner by Colonel Craig who is considered the best authority on the subject in this country. The monograph which he presents will undoubtedly stand as a classic in medical literature and will find immediate use in all medical libraries as well as in the hands of many physicians, public health workers, and laboratory technicians.

The monograph contains 12 chapters. The first deals with the history and geographical distribution of amebic infection and emphasizes the fact that acute amebic dysentery is only one of the many manifestations of infection with *Endameba histolytica,* and that the parasite is of world-wide distribution and an important cause of disease in temperate as well as in tropical regions. The chapter on etiology describes *E. histolytica* in detail, its life cycle, and its method of reproduction and transmission. It is illustrated by excellent photomicrographs and drawings.

The chapter on epidemiology takes up the subject of incidence, sources of infection, variations in the effect of the ameba on different individuals, epidemics, reservoir and transmitting hosts, and the influence of age, sex, race, climate, and individual immunity to the disease.

The two chapters on pathology describe in detail the gross and microscopic lesions produced in the intestines and in other organs and tissues of the body. They are illustrated by splendid photographs, mostly from the U. S. Army Medical Museum. Symptomatology, complications and sequelae are treated in great detail. The clinical manifestations of amebic infection and the wide variation in the symptoms and physical signs which may be produced are emphasized.

The chapter on clinical diagnosis calls attention to the difficulty of differentiating amebic infection as it affects the intestine, liver, lungs, and other organs from other diseases. The chapter on laboratory diagnosis describes in detail the other amebae which are found in the human intestine and emphasizes the importance of well trained technicians in their differentiation. It also describes methods of fecal examination and the technic of artificial cultivation of *E. histolytica.*

A chapter is devoted to a consideration of the complement fixation test, which was originated by the author and has proved to be of value in diagnosing obscure cases of amebiasis and in following the effects of treatment.

The discussion of prophylaxis is of special interest and value to public health workers. It stresses the importance of proper disposal and treatment of human excreta, the protection and sterilization of water supplies, the necessity for careful supervision by health officials of the plumbing in public buildings, the protection of food from

flies, and the supervision of public food handlers. Emphasis is laid upon the importance of personal sanitation and educational measures to prevent the spread of amebic infection.

The final chapter on treatment is especially valuable. The author discusses the history and use of all the drugs which have been advocated in treatment. He warns against the excessive use of emetine and other drugs of high toxicity and calls attention to the newer drugs which have been found to be more effective and less toxic. He outlines the treatment for amebic infections of varying degrees of severity as well as the medical and surgical treatment of amebic abscesses of the liver and lung. This chapter should prove to be of special value in encouraging safer and more effective treatment of infected individuals. Each chapter is followed by an extensive list of references and the book is furnished with a complete index.

The book is beautifully printed and well bound, for which the publisher is to be congratulated. The reviewer recommends it most highly to all public health workers. HENRY E. MELENEY

Recent Advances in Allergy—*Asthma, Hay Fever, Eczema, Migrain, etc.—By George W. Bray. Philadelphia: Blakiston,* 1934. 503 pp. Price, $5 00.

The second edition of Bray's book represents the most comprehensive review on this subject which has appeared. It is written in even better and more readable style than his first review, published some 3 years ago.

Bray's broad personal experience with the study of allergy has enabled him to read and write on the subject in an understanding way. He illustrates his own subject matter by citing and reviewing an enormous number of articles in logical order and sequence. He takes up practically every phase of the subject and discusses it adequately and well, and in a style which, though brief and concrete, is blessed with clearness.

The book shows throughout that the enormous volume of literature which we have on allergy can be mastered by the industry and intelligence of one man, and that it can be presented in such a way as to be used by students and writers on almost any branch of the subject for obtaining a brief and clear review of late literature in a short period of time.

This stupendous effort on the part of Bray ought to be appreciated and used by students and writers on allergy who wish to acquaint themselves quickly with the recent ideas on this subject without the necessity of reading the hundreds of articles which have been written on each different phase of the subject.

I wish to acknowledge with thanks, Bray's acceptance of physical allergy (altered reactability to the action of physical agents) as a specific clinical entity which can be, though need not necessarily be, related to sensitiveness caused by material agents.

The book can be recommended as one of the most complete and beautifully written reviews which has appeared on the subject. The printing and make-up of the book are excellent.

W. W. DUKE

Poliomyelitis. A Handbook for Physicians and Medical Students—*By John F. Landon, M.D., and Lawrence W. Smith, M.D., with a section on Orthopedic Aftercare by Gary DeN. Hough, Jr., M.D. New York: Macmillan,* 1934. 275 pp. Price, $3.00.

This small volume summarizes the knowledge and handling of poliomyelitis in the hospital which bore the brunt of the two largest epidemics of this disease in history. It can be recommended as

a well considered, sane, and competent handbook, without bias toward particular theories or procedures, and balanced in its consideration of the various aspects of the disease. The important section on aftercare has naturally been entrusted to one familiar with the results rather than with the acute stage of the disease. It is interesting that in contradiction to a recent German book on the disease which devotes only a short paragraph to reëducation, the procedure which, combined with rest or avoidance of stretching the weakened muscles, is fundamental in the treatment of poliomyelitis, the present volume stresses these principles as laid down by Dr. Robert W. Lovett.

In regard to the much debated use of serum for treatment or for prophylaxis, the weight of the authors' opinion seems to be against serum being of any benefit in treatment, and as for prophylaxis, the most that is said is that "it gives great psychological satisfaction to anxious parents." J. P. LEAKE

The Doctor in History—*By Howard W. Haggard. New Haven: Yale University Press,* 1934. 408 pp. Price, $3.75.

This book, according to the author, is an attempt at a "history of health," written allegedly for his children. As such, there is no attempt at scholarly treatment, and the work gives the impression of a series of sketches. The style makes it easy to read, and the book is entertaining, though it contains little that a man who is moderately well informed does not know, except for an interesting detail here and there.

The picture of the "doctor" throughout history until quite recent times gives the lay reader the vivid impression of a being with whom it would be very dangerous to visit even if in good health, and especially so if ill. This being originally crystallized the superstitions of primitive man to his personal advantage, and later lagged behind the march of general human progress by several centuries, not to be budged from Galenic tradition either by the evangelism of Paracelsus or the satire of Molière. Perhaps this is a true picture.

The book is profusely illustrated with interesting woodcut reproductions, some of which have a bearing on the text. Many have no apparent bearing, as for example, one on page 162, showing certain forms of legal torture. It is nowhere explicitly stated whether this was one of the functions of the medical profession or not.

The volume is well indexed, though for what purpose, it is difficult to say.

ALLEN E. STEARN

A Nutrition Program and Teaching Outline—*Prepared and published by the Philadelphia Child Health Society, 311 South Juniper Street, Philadelphia,* 1934. 156 pp. Price, $1.00 postpaid.

This volume is a complete revision of the first edition of 1927, bringing up to date the factual material and educational methods. It has been developed primarily for use in the health centers and clinics of the Division of Child Hygiene, Department of Public Health of Philadelphia; but it may be adapted readily to similar centers in other parts of the country.

As stated in the foreword of this outline,

> This outline continues the clarification of the laboratory findings, elaborates on the special value in certain foods and combinations of food, and stresses proper methods for the preparation of foods. It also stresses the value of good health habits, inculcated early as an important adjunct to nutrition; it brings to the attention of the student or reader the important part played by the removal of physical defects which so frequently interfere with proper nutrition even when the best balanced diets have been supplied.

Nutrition and diets for children at various age levels are given as lesson outlines which may be used flexibly in health centers or in mothers' clubs and classes. The outlines are presented clearly and concisely with helpful illustrative material and references. A selected list of reference from recent literature on nutrition appears at the end of the book. RICHARD A. BOLT

Practical Everyday Chemistry—*By H. Bennett. New York: Chemical Publishing Co.,* 1934. 305 pp. Price, $2.00.

This book should prove to be a valuable manual in many laboratories as it gives directions for preparing a variety of products as well as the composition of many common products. Various chapters give working formulae for adhesives, agricultural products, paints and related products, cosmetics and drugs, food products, beverages, inks and carbon paper, leathers, oils, constructing materials, paper, photography, plating, polishes, rubber and plastics, soaps and cleaners, textiles and many other products in use in daily life. One chapter includes tables, and other useful information regarding sources of information and materials.

Brief introductory paragraphs at the beginning of each chapter are informative. In some cases, these could have been enlarged to advantage. The author has had previous experience as the Editor of the *Chemical Formulary.*

C. S. PEDERSON

Your Meals and Your Money—*By Gove Hambidge. New York: McGraw Hill,* 1934. 190 pp. Price, $1.50.

As a basis for a popular presentation of sensible diets in relation to income, Mr. Hambidge has taken the data compiled by the nutritional workers of the U. S. Department of Agriculture. These he has expanded into a readable and authoritative text, written with a sparkle, which transcends in interest and entertainment the scientific material usually emanating from government bureaus. The average consumer faced with the problem of securing real nutriment from a restricted food budget will get many practical suggestions from the author's series of plans for diets at various levels of nutritive content and cost. Although writing primarily for the lay consumer, the author, hitherto a stranger to the complex field of dietetics, has wisely gone to the leading nutritional authorities for material and has shunned the false precepts of the food faddists who are so ubiquitous and so vociferous in this country. Health officials and physicians will find the book well worthwhile, and relief workers will find it indispensable. The average taker of sustenance may be jogged out of a rut by it.

JAMES A. TOBEY

The Theory of Play—*By Elmer D. Mitchell and Bernard S. Mason. New York: Barnes,* 1934. 547 pp. Price, $2.80.

The changes that have come during the last decade in our knowledge of psychology and in the technics in the field of recreation and physical education have made necessary the rewriting of the material in this book, which appeared in 1923 as *The Theory of Organized Play,* by Wilbur P. Bowen and Elmer D. Mitchell. The result is an excellent text.

It is divided into 4 major parts: Historical Background; Theory of Play; The Need for Play; and Administration of Play.

In their discussion of the theories of play, the authors expound as the most likely one the theory of play as self-expression. We play as we do because of our physiological and anatomical structure, our physical fitness, and our psychological inclinations. The type of

play, too, is influenced by habits and attitudes (training), by social contact and physical environment. Certain "universal wishes," such as those for new experiences, for security, for response, and for recognition, also impel us to play. To these may be added the wish for participation and the wish for the esthetic or beautiful.

For public health officials and agencies this discussion of the philosophy of play should have deep interest, since the success of health campaigns depends so intimately on health education.

This text is our most thorough, dependable, and interestingly written treatise on the theory and administration of play. It should be a part of the library of every educator.

CHARLES H. KEENE

A Short History of Some Common Diseases—*By divers authors. Edited by W. R. Bett. London: Oxford University Press,* 1934. 211 pp. Price, $3.50.

The editor describes this book as an original venture in medical literature. So it is. It is for the most part interesting and well written, and if it is followed by another volume giving the history of a larger number of diseases, it will have a distinct place in the history of medicine.

It has not been as carefully edited as it might have been. It grates on one, for example, to find the isolation of insulin ascribed to Macleod, Banting, and Best. The fact is that laboratory facilities had been given to Banting and Best during the summer when Macleod was in Europe, and that he had rather discouraged Banting. When Macleod came back and found that the epoch-making discovery had been made, he organized further research and assisted in the production of insulin, but the discovery belongs to Banting, who was assisted materially by Best.

There are also mistakes in spelling of proper names, which is generally considered inexcusable. The name of J. F. Schamberg is spelled with an "o."

The book is well printed and of convenient size. MAZŸCK P. RAVENEL

Nursing Schools—Today and Tomorrow—*Final Report on the Grading of Nursings Schools—New York City,* 1934. 268 pp. Price, $2.00.

What is wrong with nursing? What should we expect of the professional nurse? Why are there so many unemployed nurses and still so many sick unnursed and so many hospitals understaffed? This final report of the Committee on the Grading of Nursing Schools answers these and many other questions, giving us cold facts gathered in their 8 year studies carried on all over the United States. For the nursing schools it suggests a course ahead in which nursing education may be conducted on the same educational basis as that of all other professions. For the private duty nurse it offers hope for practical plans of providing quality nursing to patients who need it at a price satisfactory to both the nurse and the nursed. For the administrators of hospitals and nursing schools it gives not only definite and to-the-point plans for providing nursing service without dependence upon student service, but can also point to successful completion of such plans in different parts of the country. For the consumer, the public, the book represents a sincere effort on the part of a profession engaged in a vital community service to find a way in which it can best meet the needs of that consuming public, if the public will but hold up the hands of the profession.

The picture that this final report gives of the present status of nursing schools in this country does not engender pride in our hearts. However, the improvement made in the 8 years since the committee made its first grad-

ing, and the brave stand which the committee has taken regarding the way ahead promise a hopeful future.

Public health workers interested in the supply of public health nurses, the greatest agents for carrying health teaching into the home, cannot afford to ignore the pertinent facts in this book VIRGINIA A. JONES

The Child: His Origin, Development and Care—*By Florence Brown Sherbon, A.M., M.D. New York: McGraw-Hill,* 1934. 707 pp. Price, $3.50.

This is no ordinary book on child care. It bears the marks of careful and prolonged scientific scholarship and covers thoroughly the whole range of child life as an integrated pattern of the social structure. The only book comparable to it in English is Feldman's *Principles of Ante-Natal and Post-Natal Child Hygiene,* published in 1927.

Dr. Sherbon, however, is not content with merely stating the results of modern biochemical and physiological research; she relates these definitely to a philosophy of child life which runs consistently through the entire volume. If one were to attempt to capture this philosophy, it might be stated to be the Gestalt psychology of structural patterns framed in the theory of relativity. She writes that

> When we try to put these two ideas together—relativity and pattern—they integrate very consistently. Life ever struggles toward patterned form and expression, a struggle into which the factors of relativity to environment and time ever enter.

Reviewing the factual material in this fascinating volume, I find an arrangement which is logical and which covers the entire gamut of the child from ovum, and before, to his entrance into school. The chapters are grouped conveniently into three parts:

I. *Before the Child:* Fundamental organization of life; physical and social heredity; anatomy and physiology of reproduction; love, courtship and marriage; physiology and hygiene of pregnancy.

II. *Enter the Child:* Factors relating to birth and puerperium, the baby's first year, the important principles of the hygiene of infancy and childhood.

III. *Development, Behavior and Training:* Section which brings up to date the growth and development of the child, including the new theory of behavior and learning and describing carefully the various developmental periods as they shade into one another. Two helpful chapters for students and parents are "Religious, Aesthetic, and Moral Training of the Young Child" and "Observation of Young Children."

The book is illustrated beautifully and appropriately, especially the chapters on growth and development of the child. A selected list of references is found at the end of each chapter. The glossary of more technical terms and the complete index will prove very helpful to the student. This is a book which every student of the child should read from cover to cover, thoroughly digest, and then keep close at hand for ready reference. RICHARD A. BOLT

Periodic Fertility and Sterility in Woman: A Natural Method of Birth Control—*By Professor Hermann Knaus, Head of the Clinic for Gynecology and Obstetrics of the German University of Prague, with a Foreword by F. H. A. Marshall, F.R.S., translated by D. H. and Kathleen Kitchin. Vienna: W. Maudrich,* 1934 (*Concip Co., Hobart, Indiana*). 162 pp. 64 ill. Price, $6.50, including a separate special calendar in pocket. Calendar alone $1.50.

Studies of this kind are of great value, not so much because they provide an assured hope of a safe period,

so expanded that it will include all but 1 week out of each month, as because they will beget a powerful impulse toward regular recording of dates of menstruation and fruitful and unfruitful intercourse (and also of midmonth discomfort pointing to ovulation), and thus secure sorely needed factual material. As long as observations on human beings lack accuracy inherent in biology in cages, we have to depend on assessment of the truth of claims like those of Ogino and Knaus by checking against each other long series of patients' histories from various sources. At present the only real test of the Ogino-Knaus assurances is at the possible cost of one more child, or one more abortion.

The form of calendar is a device worth while for the intelligent, or doctor-guided, in that it demonstrates at a glance regularity or irregularity in the person keeping it, and the average length of her cycle. Several important studies show that, among women, less than 60 per cent have a 4 week type, even when admitting a range of 4 or 5 days. Thus accumulating evidence on the frequency of irregularity rather vitiates the utility of some of the new formulae. As a prime necessity and preliminary for using the calendar, Knaus insists that it must be kept for a year "scrupulously and without fail," in order that thereafter his conclusion can be put to work, namely, the "unimpeachable certainty" that "in women with normal physiology, *ovulation always takes place on the 15th day before the onset of the period.*" Always? On a given day?

Ogino, as Knaus shows, had preceded him in insistence on counting backward, but Knaus based his conclusions on new experiments, devising a way of registering uterine contractions to show that after corpus luteum formation, pituitary extract no longer caused contraction of the uterine muscle layers, either in rabbit or woman, thus demonstrating dates of ovulation.

The book presents an excellent and lucid review of the whole subject and a comprehensive bibliography. Now we await the evidence of extensive and well attested experience from those who seek the most fertile days as well as those who plan to avoid them. And we hope for new research to discover tests of irregular habits of ovulation—tests that are readily available, these, in turn, being predicated on funds for developing them.

Recent publications for professional and lay readers include the following:

Miller, A. G., Schulz, C. H., Anderson, D. W., Miller Clinic, Hobart, Indiana. The Conception Period in Normal Adult Women. *Surg. Gynec. Obst.*, 56: 1020–1025, 1933.

Miller, A. G. Is the "Safe Period" Safe? *Biol. and Med. Aspects of Contraception.* Edited by Margaret Sanger. Nat. Com. on Fed. Legislation for Birth Control. Washington, 1934, pp. 28–37.

Ogino, K. *Conception Period of Women.* Med. Arts Publishing Company, Harrisburg, Pa., 1934.

Pederson, Victor C. *Nature's Way.* Putnam, New York, 1934.

HAVEN EMERSON

Keeping a Sound Mind—*By John J. B. Morgan. New York: Macmillan,* 1934. 440 pp. Price, $2.00.

In these days of increasing appreciation of the importance of mental hygiene, this book should be a valuable find for persons seeking a really good textbook in that field, prepared with the college student in mind. The material is based upon modern psychology, but so stripped of technical terminology that the layman or the college freshman can comprehend it fully. Such intriguing chapter headings as How to Fight, How to Get Things Done, Getting Along with People, arouse a curiosity to sample those particularly suggestive chapters.

With its excellent table of contents, logically progressive chapters, review questions at the end of each chapter, a brief list of references for further reading, and its complete index, the book meets such requirements in text-

book construction. The author presents material the use of which would aid the student in the establishing of desirable mental and emotional habits, and the acquiring of the right attitudes toward the game of life.

The book is well printed and bound.

ELSIE B. SNEED

Leisure-Time Interests and Activities of Business Girls—*By Janet Fowler Nelson. New York: The Woman's Press,* 1934. 113 pp. Price, $.75.

This Research Study was conducted during 1931–1933 under the Laboratory Division of the National Board of the Y.W.C.A. by the Director. Necessarily, in so brief a report, it is largely statistical.

These young business women make up an increasing proportion—16.6 per cent in 1920, 18.8 per cent (2,000,000) in 1930—of employed women. It is a factual study of 1,000 young women, and gives apparently a cross-section of the activities of this group, which is of peculiar sociological interest.

CHARLES H. KEENE

Allergy and Applied Immunology—*A Handbook for Physician and Patient, on Asthma, Hay Fever, Urticaria, Eczema, Migraine and Kindred Manifestations of Allergy—By Warren T. Vaughan, M.D., Richmond, Va. (2d ed.) St. Louis: Mosby,* 1934. 420 pp. Price, $5.00.

Vaughan, in his usual story-book fashion, writes a second edition of his book because, as he states, the rapid advance in our knowledge of the subject makes a volume on allergy rapidly become out of date. On this account an old text ceases to be authoritative. What appeared to be a truism of yesterday may be an inaccuracy today. He states that if the text is not up to date it is better out of print.

Vaughan reviews the subject with reasonable brevity and presents the subject in a way which is amply simple for the general practitioner and can also be understood by patients. He emphasizes the need of knowledge on the part of the general practitioner for diagnostic methods and thinks that with this knowledge he can contribute immensely to the welfare of his patients. Vaughan omits from his book the technicalities on desensitization treatment because of a belief that this is not yet adapted to widespread use by those who are not thoroughly familiar with the subject. This work, he thinks, ought to be diverted to specialists who have acquired enough knowledge and experience with allergic patients to make desensitization therapy successful. Otherwise he thinks such patients are not likely to receive the desired relief which can be acquired through this study and that this practice subjects the entire method to unjust criticism.

Vaughan's book is practical throughout. He discusses in simple manner such topics as diagnostic methods, pollen surveys, location of allergens, methods of allergen avoidance, food allergens and their whereabouts, elimination diets, and the manifestations of allergy. An important chapter, VIII, is devoted to a discussion of geological locations, and the part played by altitude, heat, air humidity, and wind in symptomatology.

The book can be highly recommended as safe and sound for general practitioners and patients.

The printing and make-up of the book are excellent. W. W. DUKE

Healthy Babies Are Happy Babies—*Complete Handbook for Modern Mothers—By Josephine Hemenway Kenyon, M.D. Boston: Little, Brown,* 1934. 321 pp. Price, $1.50.

Out of the wealth of experience in instructing mothers and answering their

multitude of questions through the Health and Happiness Club of *Good Housekeeping*, Dr. Kenyon has acquired a facility of presenting subject matter which is a delight to read. She confesses modestly in the preface that it took courage to write another book on child care while she faced three long shelves of similar publications treating every phase of the subject. She has justified her temerity, however, by producing a compact handbook, conveniently arranged for reference, which answer the questions of mothers, and prospective mothers, in clear, concise, "homey" language. The book has a direct, personal appeal which every intelligent mother will appreciate.

The material is arranged in chapters which consider chronologically the important features of each stage in the growth and development of the child, beginning with the prenatal period and extending through the third year. Two helpful chapters on the common communicable diseases of childhood and on emergencies are added to the general plan. The appendix contains a classification of the usual foods given to children up to 3 years of age, a vitamin table, and foods for different months up to one year of age. RICHARD A. BOLT

Stand Up and Slim Down—*By Ettie A. Hornibrook. Garden City, N. Y.: Doubleday, Doran,* 1934. 167 pp. Price, $1.95.

This treatise is devoted to a discussion of the causes and correction of constipation and obesity in women, with the major emphasis on "restoration exercises," the aim being "youthful slenderness, graceful carriage, and poise."

After a brief description of the effects of weakened abdominal and pelvic muscles upon constipation and, oftentimes the resultant marital inefficiency and unhappiness, a considerable portion of the text is devoted to a description of movements and posture in their relation to constipation and bodily health.

Another relatively large section is devoted to a discussion of food selection, as related to obesity and intestinal efficiency.

In the section on movements, there are some excellent postural—including foot, leg, and pelvic—exercises. The effects of faulty shoes, especially too high heels, and the need of proper corset and brassiere are discussed.

This is a much worthwhile book for laymen and physicians. It is made better and more usable by a careful index. CHARLES H. KEENE

Medicine Marches On— *By Edward Podolsky, M.D. New York: Harper,* 1934. 343 pp. Price, $3.50.

The reviewer has always felt some doubt of the value of books of this type, though it must be admitted that the public will read them when they will read no others, and the facts of medical research do need some popularizing. Unfortunately, those who have the facility for popular writing make use of their gift, and intentionally or otherwise, give some wrong impressions. These are sometimes followed up by lay readers by the study of truly scientific books, but more often not.

The book under discussion strikes us as being one of the best of its type. It is unusually complete and the author has evidently kept track of investigation in the field as well as in laboratories. It contains a vast amount of information, practically all of which is correct as far as the reviewer can determine, though as already said, much of it is put in ways which are not pleasing. The titles are almost all dramatic, for example: The Poison-Fighters, Radium Bullets and Crazy Cells, Obesity and the Fat-Melters, etc.

The English as well as the spelling of names could be improved. However,

the book is intensely interesting and we hope that it will serve a useful purpose. Unfortunately, most readers have not the background for judging the exaggerations, overemphasis, etc. There are many quotations, all in italics, from well known scientists and medical men. The printing is excellent and the paper is light, making it a pleasant book to read. MAZŸCK P. RAVENEL

BOOKS RECEIVED

POLIOMYELITIS. A Handbook for Physicians and Medical Students. By John F. Landon and Lawrence W. Smith. New York: Macmillan, 1934. 275 pp. Price, $3.00.

STANDARD CLASSIFIED NOMENCLATURE OF DISEASE. 2d ed. Compiled by The National Conference on Nomenclature of Disease. Edited by H. B. Logie. New York: Commonwealth Fund, 1935. 870 pp. Price, $3.50.

ANNUAL REPORT OF THE SURGEON GENERAL OF THE PUBLIC HEALTH SERVICE OF THE UNITED STATES FOR THE FISCAL YEAR 1934. Washington: Government Printing Office, 1934. 143 pp. Price, $.75.

ANNUAL REPORT OF THE SURGEON GENERAL U. S. ARMY TO THE SECRETARY OF WAR, 1934. Washington: Government Printing Office, 1934. 205 pp. Price, $.15.

ABASTECIMIENTO DE AGUA POTABLE (DRINKING WATER SUPPLY). By Juan Lazaro Urra. Madrid: Revista de Obras Publicas, 1935. 502 pp. Price, 46 Pesetas.

THE CRIPPLED AND THE DISABLED. By Henry H. Kessler. New York: Columbia University Press, 1935. 337 pp. Price, $4.00.

STAMMERING AND ALLIED DISORDERS. By C. S. Bluemel. New York: Macmillan, 1935. 182 pp. Price, $2.00.

PERSONAL HYGIENE APPLIED. 5th ed. By Jesse Feiring Williams. Philadelphia: Saunders, 1934. 529 pp. Price, $2.25.

GROWTH AND DEVELOPMENT OF THE YOUNG CHILD. 2d ed. By Winifred Rand, Mary E. Sweeny and E. Lee Vincent. Philadelphia: Saunders, 1934. 429 pp. Price, $2.75.

THE POPULAR PRACTICE OF FRAUD. By T. Swann Harding. New York: Longmans Green, 1935. 376 pp. Price, $2.50.

COMMUNITY HYGIENE. Rev. ed. By Dean Franklin Smiley and Adrian Gordon Gould. New York: Macmillan, 1935. 369 pp. Price, $2.00.

INFANTILE PARALYSIS. By George Draper. New York: Appleton-Century, 1935. 167 pp. Price, $2.00.

TUBERCULOSIS. By Fred G. Holmes. Appleton-Century, 1935. 312 pp. Price, $2.00.

FUNDAMENTALS OF DAIRY SCIENCE. 2d ed. By Associates of Lore A. Rogers. New York: Reinhold Publishing Corporation, 1935. 616 pp. Price, $6.00.

REPORT ON THE EVALUATION OF PRENATAL CARE. By Margaret Tyler, J. H. Watkins and H. H. Walker. New Haven: Institute of Human Relations, 1934. 68 pp. Price, $1.00.

VOLUNTARY STERILIZATION. By C. P. Blacker. New York: Oxford Press, 1934. 145 pp. Price, $1.75.

MEMOIRS OF A SMALL-TOWN SURGEON. By John Brooks Wheeler. New York: Stokes, 1935. 336 pp. Price, $3.00.

RECORD BOOK FOR TUBERCULOSIS PATIENTS. By Lawrason Brown. New York: Journal of the Outdoor Life, 1935. Single copies $.15, special price in quantities.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Rats, Typhus and Relief—Endemic typhus is a serious problem in Alabama and some of the other southern states, thanks to the rat, his fleas, absence of rat proofing, ample food and mild winter climate. CWA rat control is helping.

BAKER, J. N., *et al.* Endemic Typhus in Alabama. Pub. Health Rep. 50, 1:12 (Jan. 4), 1935.

Lead Poisoning—A clinically proved and detailed method is reported upon the control of lead poisoning in which experience counts much for success in administration.

BELKNAP, E. L. Control of Lead Poisoning in the Worker. J.A.M.A. 104, 3:205 (Jan. 19), 1935.

World Health—What the health organization of the League of Nations has done, is doing, and plans to do may seem overly ambitious, but new generations will be amused by its limited vision, this reporter believes.

BOUDREAU, F. G. Health Work of the League of Nations. Milbank Quarterly 13, 1:3 (Jan.), 1935.

Getting Rid of Sewage Sludge—Difficulties experienced in solving the ever present problem of sludge disposal in sewage treatment are set forth in this discussion of modern methods.

CERNY, P. J. Treatment and Disposal of Sewage Sludge. Munic. San. 6, 1:10 (Jan.), 1935.

Practical Tuberculosis Control Economics—About a quarter of the uncoöperative tuberculosis contacts in New Haven (611 persons) were finally induced to submit to an X-ray examination. In this large group no active cases were found and only a few healed lesions. From this it is concluded that the examination of the contact who consistently fails to coöperate is not worth the expense of the extraordinary efforts needed to get him into the clinic.

EDWARDS, H. R. An Attempt to Secure X-Ray Examination of the Uncoöperative Tuberculosis Contact. New Eng. J. Med. 212, 5:198 (Jan. 31), 1935.

Advice about Buying Food—As an example of suggestions to field workers in educating families to make better purchases of foods, this paper indicates that the method might well be applied to other health educational projects.

FISHER, R. W. What Shall the Public Health Nurse Tell Families about Buying Food? Pub. Health Nurs. 27, 1:11 (Jan.), 1935.

From Settlement to Healh Center—A fine, brief story of the development of the neighborhood health service idea and its present-day manifestations.

HISCOCK, I. V. The Development of Neighborhood Health Services in the U. S. Milbank Quart. 13, 1:30 (Jan.), 1935.

When Is Gonorrhea Cured?—Gloomy conclusions about the cureability of gonorrhea follow this summary of the criteria of cure which include palpation, culture, complement fixation test, and provocative diet.

KING, A. J. The Criteria of Cure of Gonorrhea in the Male. J.A.M.A. 104, 3:178 (Jan. 19), 1935.

Tuberculosis Work Well Done—The results of the Cattaraugus County Tuberculosis case-finding program are

summarized for the benefit of the world-wide anti-tuberculosis movement. It is emphasized that tuberculosis control can grow at its best only with an adequate public health program.

KINGSBURY, J. A. Methods in Further Control of Tuberculosis. Milbank Quart. 13, 1:68 (Jan.), 1935.

Asbestos in Lungs—Lung fibrosis caused by asbestos dust appears to be milder than that produced in silicosis. However, dust in asbestos plants can, and should, be reduced and workers should have periodic physical examinations.

LANZA, A. J., *et al.* Effects of the Inhalation of Asbestos Dust on the Lungs of Asbestos Workers. Pub. Health Rep. 50, 1:1 (Jan. 4), 1935.

Incidence of Lead Poisoning—In industrial hygiene studies, when the gastrointestinal diseases outnumber respiratory diseases, suspect the possibility of lead poisoning. This condition is common and often results in wrong diagnoses.

LANZA, A. J. Epidemiology of Lead Poisoning. J.A.M.A. 104, 2:85 (Jan. 12), 1935.

Digestion's Time Table—Ordinary meals leave the stomach in 4 hours; a very large one in 5; large amounts of fat delay emptying of the stomach; concentrated carbohydrates leave quicker than natural ones; cooking shortens digestion time for some foods, lengthens others; finally, hunger apparently does not depend upon vigorous peristalsis. These fluoroscopic findings, except the last, confirm accepted beliefs.

MAILE, W. C. D., and SCOTT, K. J. L. Digestibility of Common Foodstuffs as Determined by Radiography. Lancet. 1, 1:21 (Jan. 5), 1935.

What Water Can Be Made Fit to Drink?—A basis is proposed for formulating a limited standard of pollution for sources of water supply in the hope that it will stimulate discussion and action by sanitarians.

STREETER, H. W. Limits of Pollution Loadings for Water Purification Systems. J. Am. W. W. Assn. 27, 1:1 (Jan.), 1935.

ASSOCIATION NEWS

SIXTY-FOURTH ANNUAL MEETING
MILWAUKEE, OCTOBER 7–10, 1935
Headquarters: Hotel Schroeder

MILWAUKEE LOCAL COMMITTEE

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Dr. J. J. Seelman, Wisconsin State Board of Health
Dr. Millard Tufts, The Medical Society of Milwaukee County

Rev. A. F. Berens, Regent, Marquette University Medical School. *Chairman, Attendance, Reception and Hospitality Committee*
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George A. Dundon, Milwaukee Health Department. *Secretary*

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RESIGNATION OF DR. HAYHURST FROM THE EDITORIAL COMMITTEE

EMERY R. HAYHURST, M.D., Ph.D., of Columbus, Ohio, and for seventeen years Associate Editor in Industrial Hygiene on the *American Journal of Public Health,* resigned as of January 1, 1935. This was necessitated because of the demands of his own work. Dr. Hayhurst has been a Member of the Association since 1913, and was elected a Charter Fellow in 1922.

The Committee on Meetings and Publications, in session on Saturday, January 12, 1935, adopted the following:

Resolution

WHEREAS, Dr. Emery R. Hayhurst has served on the Editorial Committee of the *American Journal of Public Health* since 1918, and

WHEREAS, the Industrial Hygiene interests of the Association have been served by countless pages of material emanating from his pen, and

WHEREAS, his advice and assistance to the Editor have been of incalculable value, therefore be it

RESOLVED that the Committee on Meetings and Publications extend to him its warm thanks and deep appreciation for his wisdom, counsel, and continuous labors which have resulted in distinct improvement in the *American Journal of Public Health* and definitely valuable contributions to public health literature.

C. C. YOUNG, D.P.H., *Chairman*
HOMER N. CALVER
ARTHUR P. MILLER
MAZÝCK P. RAVENEL, M.D.
CHARLES F. WILINSKY, M.D.

The *Journal* has been most fortunate in securing the services of Henry H. Kessler, M.D., of the Department of Labor, Newark, N. J., as Associate Editor in Industrial Hygiene, to take over the work of Dr. Hayhurst. Dr. Kessler has been a Member since 1927 and a Fellow since 1929.

WESTERN BRANCH A.P.H.A.

The Sixth Annual Meeting of the Western Branch will be held in Helena, Mont., July 1, 2, and 3. William F. Cogswell, M.D., Department of Health, Helena, is General Chairman.

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

Emily F. Bolcom, M.D., P. O. Box 1975, Los Angeles, Calif., Medical Director, Women's Venereal Disease Division, Los Angeles City Health Department

Julius R. Bolles, M.D., Napoleon, Ohio, Henry County Health Commissioner

Frank C. Cady, U. S. Public Health Service, Washington, D. C., Course of Study, National Institute of Health

B. Booker Dalton, M.D., Rockingham, N. C., Richmond County Health Officer

Alonzo E. Hardison, Jr., M.D., Jacksboro, Tenn., Associate Director, Anderson-Campbell County Health District

E. M. Lucke, M.D., Court House, Hannibal, Mo., Marion County Health Officer

Emile Martel, M.D., D.P.H., Amos, P. Q., Canada, Medical Director, County Health Unit

Leo M. Michalek, M.D., Lackawanna, N. Y., Health Officer

Wu Chi Moy, M.D., Chung Sun Memorial Library, Canton, China, Special Commissioner on Public Health

Alton R. Perry, M.D., M.P.H., Natchez, Miss., Director, Adams County Health Dept.

Albert Supple, M.D., 1401 Fair Oaks Ave., S. Pasadena, Calif., City Health Officer

John M. Uhrich, M.D., Parliament Bldgs., Regina, Sask., Canada, Minister of Public Health

George M. Wells, M.D., City Hall, Bowling Green, Ky., Director, Warren County Health Dept.

Thomas B. Wilson, M.D., Box 1296, Longview, Tex., Assistant Director, Gregg County Health Unit

Laboratory Section

Joseph L. Hileman, M.S., 810 Burnet Ave., Syracuse, N. Y., Chief of Laboratory Division, Dairymen's League Cooperative Assn.

Robert A. H. Mackeen, General Hospital, St. John, N. B., Canada, Director of Laboratories

Vital Statistics Section

Halbert L. Dunn, M.D., Ph.D., Univ. of Minnesota Hospitals, Minneapolis, Minn., Director, University of Minnesota Hospitals and Professor of Medical Statistics

Public Health Engineering Section

Blair I. Burnson, B.S., 2079 Oakland Ave., Piedmont, Calif., Sanitary Department of East Bay Municipal Utility District

Morgan D. Hayes, B.S., Rm. 52, City Hall, Rochester, N. Y., City Engineer

William T. Ingram, A.B., 130 S. American, Stockton, Calif., Sanitary Engineer, San Joaquin Local Health District

Industrial Hygiene Section

C. L. Jones, 1118 Delaware Trust Bldg., Wilmington, Del., Safety and Service Dept., Hercules Powder Co.

Wendell Stewart, M.D., Murphy Bldg., East St. Louis, Ill.

Food and Nutrition Section

James A. Berry, M.S., Frozen Pack Laboratory, U.S.B.P.I., Spokane St. Terminal, Seattle, Wash., Research Bacteriologist, Frozen Fruits and Vegetables

Beth Konkel, Oklahoma City, Okla., Executive Secretary, Tuberculosis Society of Oklahoma City

Fred V. West, Dr.P.H., 1801 La Cienega, Los Angeles, Calif., Director of Technical Service, Adohr Milk Farms

Child Hygiene Section

Lester A. Gerlach, D.D.S., City Hall, Milwaukee, Wis., Dental Director

Public Health Education Section

Fanchon Hart, B.S., 115 W. 68 St., New York, N. Y., Professor of Bacteriology, College of Pharmacy, Columbia University

A. D. Lapp, M.B., Tranquille, B. C., Canada, Medical Superintendent, Tranquille Sanatorium

Don C. Lyons, D.D.S., 1405 National Bank of Jackson Bldg., Jackson, Mich., Author, Dental Section, Health and Hygiene Column, Univ. of Michigan and Affiliated Organizations

Epidemiology Section

John J. Hanlon, S.B., Department of Health, 3919 John R. St., Detroit, Mich., Statistician

Public Health Nursing Section

Elizabeth P. August, R.N., 50 E. Broad St., Columbus, O., General Secretary, Ohio State Nurses Assoc.

Helen Cochran, State Dept. of Health, State Office Bldg., Richmond, Va., Assistant Director, Bureau of Public Health Nursing

Joseph L. Daniel, R.N., Lawrenceville, Va., Research Worker, U. S. Public Health Service

Unaffiliated

Ralph I. Canuteson, M.D., 1638 Mississippi St., Lawrence, Kans., Director of Health Service, University of Kansas

C. P. Coogle, M.D., U. S. Public Health Service, Houston, Tex., Malarialogist

Reginald O. Davison, M.D., Dept. of Public Health, Parliament Bldgs., Regina, Sask., Canada, Deputy Minister

Sister Mary Edward, Dominican College, San Rafael, Calif., Librarian

Samuel S. Feuerstein, M.D., 42–15 34 Ave., Astoria, N. Y., Physician in active practice

NEWS FROM THE FIELD

BIRTH REGISTRATION CAMPAIGN

THE Bureau of the Census, with the aid of workers on the pay roll of the F.E.R.A., is carrying on a campaign which has for its primary purpose the education of the public regarding the importance of birth registration. Although it involves the post-card check customarily employed by the Bureau, the testing aspect is emphasized only as it relates to intra-state comparisons, the state health authorities being given to understand that there is no thought of checking their eligibility to remain in the registration area, that the purpose, on the contrary, is to assist them in securing the best possible registration within their state.

Campaigns in the following states have been conducted or provided for in the order here given: Georgia, West Virginia, Vermont, New Hampshire, Mississippi, Arkansas, Oklahoma, Missouri, Kansas, Iowa, South Dakota, North Dakota, Montana, Wyoming, Colorado, Utah, Idaho, Washington, Oregon, California, Nevada, North Carolina and Alabama. Other states may be added to the campaign plans in 1935.

In each state there is a publicity director on the F.E.R.A. pay roll, while the Census Bureau provides field representatives, each of whom supervises the checking in from one to three or four states.

One of the incidental benefits of the campaign is that it establishes a direct contact between the Bureau and the state authorities, such as has not always existed heretofore. Another is that it furnishes material for a study of effective methods of promoting birth registration; and also for a study of the problem of securing an accurate check on birth registration. It is expected that a monograph or report will be prepared on each of these subjects.

In connection with this campaign it developed that a number of states have no adequate indexing of births and deaths, so that searches, if made at all, depend on certificates or journal entries arranged in chronological order. The Census Bureau has it in mind to select or devise a standard indexing procedure which may be recommended to those states which desire to introduce a system of indexing or to improve on one already in use.—A. W. H.

SMILEY HEADS NEW YORK STATE HEALTH EDUCATION

AN outstanding change in management of the health program in the schools in New York State occurred February 8, when Franklin Smiley, M.D., F.A.P.H.A., was inducted as director of the health and physical division of the State Education Department.

Dr. Smiley, who has won wide recognition during his 15 years as director of the health service at Cornell University, will collaborate with Dr. Frank P. Graves and a committee of the board of regents in an effort to improve the health of two million school children in the state. He will have the assistance of associated bureaus in the education department, as well as teamwork from such independent groups as the Mental Hygiene Department and the State Health Department.

In addition to being an author on health and physical education subjects, Dr. Smiley is chairman and secretary of the American Student Health Association and Associate Professor of Hygiene and Preventive Medicine at Cornell.

CERTIFICATE IN SANITARY INSPECTION

THE University of Southern California announces that it is offering courses leading to a Certificate in Sanitary Inspection.

Among the elective subjects suggested for completion of the Certificate are the following: Public health law, inorganic chemistry and qualitative analysis, sanitation and purification of water, organic chemistry, food products, general bacteriology, sanitary science, sanitary engineering, applied psychology, public relations, technical report writing and general zoölogy.

The tuition fee is low, and full information regarding the course may be secured by addressing W. Ballentine Henley, School of Government, 202 Wilson Building, Los Angeles, Calif.

ADULT EDUCATION

THE Tenth Annual Meeting of the American Association for Adult Education (66 East 42 St., New York) will be held in Milwaukee, Wis., May 20–22. Headquarters will be at the Hotel Schroeder. There will be sessions on public schools as adult education centers; adult education in rural communities; adult education under public auspices; vocational education and adjustment for adults; rural library service; avocational interests of adults; training community leaders; readability; and mechanical aids to learning.

Representatives of organizations with adult education programs and all other interested persons are cordially invited to attend the meetings.

TENTH PAN-AMERICAN SANITARY CONFERENCE IN BOGOTA IN 1938

AT the Ninth Pan-American Sanitary Conference held recently in Buenos Aires, it was voted to hold the Tenth Conference at Bogota in 1938.

Surgeon General Hugh S. Cumming, of the U. S. Public Health Service, was reëlected Director General of the Pan-American Sanitary Office. Dr. Gregorio Araoz Alfaro, of Argentina, was elected Honorary President.

Other officers of the office are Dr. Carlos Enrique Paz Soldan of Peru, Vice-President; Dr. Carlos J. Mongo of Peru, Alternate Vice-President; Dr. Justo F. Gonzalez of Uruguay, Secretary; Dr. Rafael Schiaffino of Uruguay, Alternate Secretary.

Other members of the office are Dr. Solón Nuñez of Costa Rica, Dr. Francisco de P. Miranda of Mexico, Dr. Carlos Diez del Ciervo of Venezuela and Dr. Waldemar Coutts of Chile.

Dr. Jorge Bejarano of Colombia was elected organizing president.

NEW AND BETTER TUBERCULIN AIDS CATTLE-HEALTH CAMPAIGN

A NEW tuberculin, free from foreign protein, has been in use since last April in the testing of cattle for tuberculosis, the U. S. Department of Agriculture reports. The new product is materially superior to the tuberculin formerly available. Officials point out that the improvement came at a particularly fortunate time, since tuberculin testing has been increased as an emergency and drought relief activity, and more cattle have been tested in the last 8 months while the new tuberculin has been available than in any previous similar period of the campaign. Dr. M. Dorset, of the Bureau of Animal Industry, says that enough of the new tuberculin is being produced to test more than 18,000,000 cattle annually. U. S. Dept. of Agriculture, Jan. 24, 1935.

MOTHER'S DAY—MAY 12

A NATION - WIDE Campaign to make maternity safe has been planned by the Maternity Center Association, 1 East 57th Street, New York City. The climax of the effort will be timed for the week previous to Mother's Day, which falls this year on May 12.

PUBLIC HEALTH SERVICE ARRANGES INSTRUCTION OF COUNTY HEALTH OFFICERS

THE School of Hygiene and Public Health of The Johns Hopkins University has arranged, at the request of the U. S. Public Health Service, to offer a short course for candidates for appointment as County Health Officer. The course, which began February 6, covers a period of 12 weeks, of which 8 weeks will be spent in intramural work and 4 weeks in the field. Admission has been limited to applicants recommended by the health officers of the states, and appointed by the Public Health Service.

The instruction includes courses in public health, bacteriology, statistics, epidemiology, parasitology, sanitary engineering, and health administration. Dr. H. S. Mustard, Associate Professor of Public Health Administration, is in general charge of the course.—A. W. H.

CHEMISTS NOTE TERCENTENARY

FRANCIS P. GARVAN, president of the Chemical Foundation, has been named honorary chairman of the New York committee which will organize the celebration of the 300th anniversary of the founding of the nation's chemical industries.

The celebration will be held in New York in conjunction with the eighty-ninth meeting of the American Chemical Society, from April 22 to 26. According to Prof. Arthur W. Hixson of Columbia University, general chairman of the committee, more than 10,000 chemists and industrialists are expected to attend the meeting.

NATIONAL NEGRO HEALTH WEEK

THE twenty-first Annual Observance of National Negro Health Week will be from March 31 to April 7, inclusive. For full information, write National Negro Health Week Committee, U. S. Public Health Service, Washington, D. C.

POPULAR LECTURES ON DOCTORS

UNDER the auspices of the Education Department of the Community Church, 550 West 110 Street, New York, Dr. Philip J. R. Schmahl, Professor of Medicine at Flower Hospital and N. Y. Homeopathic Medical School, will give a series of two lectures on "The Ceaseless Struggle Between Doctors and Death" (illustrated).

SAFETY RECORD

A RECORD of 9,166,135 consecutive man hours, without a lost time accident, is the record set up by the Western Clock Company of LaSalle, Ill. The National Safety Council thinks this is the outstanding industrial safety record of America.—*Am. Druggist*, Jan., 1935, p. 6.

PERSONALS

DR. HARRY B. SMITH has resigned from his position with the Connecticut State Health Department, to accept the position of Superintendent of Health, of West Hartford, Conn., following the resignation of Dr. Theodore F. Foster, member A.P.H.A., due to ill health.

DR. FREDERICK G. NOVY, Dean of the University of Michigan School of Medicine since September, 1933, announced his retirement effective at the close of the current semester. His resignation ends 48 years' association with the institution.

ETHEL JACOBS, R.N., of Albion, Ind., member A.P.H.A., has resigned from her position as Noble County Public Health Nurse to become the 7th E.R.A. advisory nurse on the staff of the Indiana Bureau of Public Health Nursing.

THOMAS J. DUFFIELD, member A.P.H.A., was appointed Registrar

of Records of the New York City Department of Health on January 16. The position of Registrar of Records had been vacant since the retirement of Dr. William H. Guilfoy in 1930 after 40 years of service.

Mr. Duffield brings to the office a varied experience in the field of public health and vital statistics. Following his graduation from the Massachusetts Institute of Technology with the class of 1914, he became Health Officer and Registrar of Vital Statistics in Summit, N. J., a post he left in 1917 to accept a commission in the Sanitary Corps of the Army. From this post, he resigned with the rank of Major, in 1919, after service at Camps Lee and Fremont in the United States, and in the office of the Chief Surgeon of the American Expeditionary Forces in France. He then became Statistician of the Commission for the Prevention of Tuberculosis in France, with headquarters in Paris, and in 1923, after a term as Instructor in Vital Statistics at the School of Public Health, Harvard University, he returned to Europe as a member of the Health Section of the League of Nations.

Returning to the United States in 1925, he served successively with the New York Commission on Ventilation, the New York Academy of Medicine and, since 1932, the Statistical Bureau of the Metropolitan Life Insurance Company.

DEATHS

DR. POWHATAN STANLEY SCHENCK, for 25 years Director of Public Welfare and Health of Norfolk, Va., died on January 24. He became a member of the Association in 1911, and was a Charter Fellow, but because of ill health resigned in 1931. He was 72 years old.

KATHRYN KERSH SCHULKEN, R.N., of Denver, Colo., member A.P.H.A., died recently. She was Superintendent of the Denver Visiting Nurse Association from 1921 until her death. She was a member of the American Nurses' Association, of the National League of Nursing Education, of the National Organization for Public Health Nursing, and the American Association of Social Workers.

HARRY F. FERGUSON, Chief Sanitary Engineer of the Illinois State Department of Public Health, and member A.P.H.A., died January 16.

CONFERENCES

Mar. 27–29, Canadian Section, American Water Works Association, London, Ont., Canada.

March 31–April 7, National Negro Health Week—21st Annual Observance.

April 3–6, 8th Annual Convention, Southern Physical Education Association, Atlanta, Ga.

April 10–11, Montana Section of American Water Works Association, Helena, Mont.

April 11–12, Four States Section Meeting of American Water Works Association, Atlantic City, N. J.

April 24–27, National Convention, American Physical Education and its Eastern District Society, Pittsburgh, Pa.

April 29–May 3, 39th Annual Convention, National Congress of Parents and Teachers, Miami, Fla.

April 29–May 3, 19th Annual Clinical Session of the American College of Physicians, Philadelphia, Pa.

May 12, Mothers Day.

May 6–10, Annual Convention of American Water Works Association, Cincinnati, Ohio.

May 20–22, Tenth Annual Meeting of the American Association for Adult Education (66 East 42 Street, New York), Milwaukee, Wis.